



SATURDAY, JULY 22, 1871.

Contributions.

AN AMERICAN ENGINEER IN ENGLAND.

The Fences on English Railroads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A few words may be useful even upon so plain and simple a subject as the fences, which, throughout all England, are most carefully maintained along the railways, even though, as in some parts of Scotland, there is nothing but the bare rocky sheep-pasture with its slight covering of moss or stunted grass from which the lines must be enclosed.

The simplest form of fence that I have seen is that put up sometimes for the protection of men who may be at work by the side of a track upon which frequent trains are passing, as in several places where the grading is now going on for the additional track to be laid upon the main line of the London & Northwestern Railway. To give room for this new track many cuttings must be widened, and men with horses must be brought to work close to the passing trains.

In order simply to mark a line up to which men and horses may come with safety, a row of posts about 4-inches square is set in the ground for a distance of a quarter or a half mile, as may be needed at the time, and along the top of these posts a single wire is stretched and fastened in any convenient temporary way. Behind this slight barrier or line everyone may be safe, while the chance is that without something of the kind a workman in a thoughtless moment would stray upon the track and be in serious danger from a passing train. In an instance of this kind the permanent fence which is displaced is moved back to the point required by the width of the new banks or cuttings, so that no straying of animals upon the line can occur at any time when the workmen may be absent.

Sometimes, when an entirely new line is building, the permanent fence is put up at the very first, and even long before any earth or other work is begun, the fence being located by the side stakes placed by the engineers.

In general, however, in all parts of the country where a hedge will grow, and where hedges are the usual means of dividing fields, the fence first placed is designed to last only long enough to give the hedge a fair start and a sufficient height to keep animals from getting over or through it, and this height and thickness is generally obtained in from six to eight years, and by that time the original fence will be quite gone to decay, even with the occasional repairs that may have been put upon it. Some of the wooden fences put up for this purpose have posts as small as 3 by 6 inches, the flat side being placed across the line of the fence, and the ends of the rails are fitted into mortices cut through the posts. These rails are usually $1\frac{1}{2}$ by 5 inches, and the ends of each are tapered for a few inches, so that when the taper end of one rail is inserted into the mortice in the post from one side, the similarly tapered end of the next rail is put into the mortise from the other side, and forced tight in the tapered ends, thus wedging close upon each other. The rails are always placed with their edges upward, and they are tapered obliquely across the flat sides, so that this wedging has no tendency to split the posts. These ends are sometimes nailed to the mortised posts, and around the head of each post is often placed a band of thick hoop iron, to prevent, so far as may be, any splitting of the post when it is driven into the ground. In many cases, however, perhaps in most, there is not so much reliance placed upon driving the posts down as in setting it in the common way, in a hole dug for the purpose. The posts are set at distances of 12 or 16 feet, as may be needed to suit the length of the rails, and between them are nailed one or two vertical pieces to stiffen the fence so far as possible. I do not think the usual form of board fence employed in the United States is at all used here, chiefly, no doubt, because it is here found preferable to import all the small timber in the shape of "deals" or sawed stuff, and of a greater thickness than boards, and hence there are no round or split posts and common boards to be had. It may be, also, that the preference of the English mind for some more substantial thing than a fence made of 1-inch boards would prevent their use even if they were readily obtained. Generally, these rail fences do not much differ from our own in height and in the spaces between the rails, but it is found occasionally necessary to run a

single rail along the fence between the lower rails to keep lambs from getting through.

In a very few instances a neat picket fence is placed at the edge of the grounds adjoining some residence, but the most common method of enclosing the line at such points is with a high brick wall.

The hedge plants, usually the common thorny shrubs, are set as soon as may be after the earthworks of the line are completed, and are as well cared for as possible, although it does not appear that any special attempt is made to thicken up and strengthen the hedge by bending down and intertwining the long shoots year by year. In some cases the hedges are kept very carefully and neatly trimmed, especially near the stations, but in other places no especial pains seems to be taken to preserve any closeness of culture, provided a sufficient thickness be obtained at the base. The time already mentioned, six or eight years, is quite enough to enable the fence to be dispensed with, although some thin or low spots may need to be protected for a year or two longer, and, indeed, whenever in the after life of a hedge upon a railway any thin spot appears, a fence or railing of some kind is immediately put up there and maintained as long as it is needed.

All the fences or hedges are put as near to the edge of the cutting or foot of the bank as may be, and since the slopes of both the banks and cuttings are made, in the first instance, to the exact angle required by the material used, there is rarely any necessity for removing or rebuilding a hedge or a fence, except when a slip occurs, or some new track is to be put down. In a few instances I have noticed that the hedges were brought in very close to the track when a line passed through a level district and also very nearly on a level with the surface of the adjacent fields.

In some parts of the country the thinness of the soil would prevent the successful use of hedges, and hence the stone which is available in nearly all such cases is used for walls. These walls are generally laid dry, so far as my own observation goes, although many places are put up with mortar. It is quite common to see the lower part of a wall laid dry, when the upper part, say eight or ten inches, is laid with mortar, and with a course of stones with rounded corners laid in mortar upon the top to make a neat finish. This top course sometimes has a sort of castellated outline, one stone being laid upon its flat side and the next upon its edge, and so on. In one or two instances that I noticed, this irregular outline was given by placing thin stones of a nearly three-cornered shape upon edge on the top of the wall, so that the uppermost corners should alternate with each other along the breadth of the wall. It will be readily seen that quite a variety of pleasing appearances may thus be given, even to a common wall, with ordinary stone and at a small extra cost for labor.

There are some cases where it would seem that the stone wall had not been built high enough at first, and a post and rail fence has been put up behind it, the rails being nailed only to that part of the post, one or two feet, that projects above the wall. In a few instances, too, the top of the stone work of the wall is left low purposely, and some rather heavy blocks of stone are set in the wall and flush with the top about seven or eight feet apart. In these blocks are fixed wrought-iron uprights $1\frac{1}{4}$ inches by $\frac{3}{4}$ inch, and through the tops of these is passed a single wire, or a small wire rope, to give to the fence the additional height of 10 or 12 inches that may be required. The wire, when a single one is used, is rarely above $\frac{1}{4}$ inch diameter, and the wire rope is, for this purpose, about $\frac{3}{8}$ inch diameter.

Within the limits of towns, where space is valuable, and railway structures of all kinds should be as slightly as possible (in theory at least), walls of brick are almost invariably used, excepting, of course, in those parts of the country where stone is the prevailing material, and brick are quite high in price. In the vicinity of London the pale yellow bricks are chiefly used, with a coping of stone or of blocks made and burned for the purpose at the brick yards, or sometimes at the potteries, where they are made of a better material. These coping blocks are commonly 16 inches long (or to suit the thickness of the wall), 5 inches high and 4 inches thick, and being placed on edge reach entirely across the wall. The upper corners of the coping are rounded on each side, and generally the blocks are half an inch higher in the center, and slope towards each side of the wall. In some cases these blocks are shorter and two are used, a long one and a short one, to reach over the thickness of the wall; but in this way an additional number of joints is exposed, on the top of the wall, to the weather. Occasionally the coping blocks are colored black and are glazed in the manufacture. In a few instances that I have noticed, where a specially ornamented appearance

is desired for a wall, shallow buttresses or pilasters are built and surmounted with stone caps, and sometimes bricks of different color are used. A great many of the red bricks here are of very imperfect manufacture, and a part of these imperfections have indirectly grown, I am told, from the exactions of the bricklayers. These men were compelled by their employers to receive pay by the hour, and they thereupon determined to lay only a fixed number of brick per hour. The employers at once required all bricks to be made larger, and now the standard for a great part of the red bricks is 3 by $4\frac{1}{2}$ by 9 inches. The chief objection to such brick is that, being so large, they are very imperfectly manufactured, and, by the means commonly used, cannot be properly burned, so that it is not an uncommon thing to see the side of a wall which has never been painted crumbling and falling away, especially if it has been exposed to any unusual wash by the rain.

A fence much used in some parts of the Scotch Highlands is made of wire, with wrought-iron posts or uprights, and heavy cast-iron posts are placed at suitable distances, in which are set ratchet-wheels with pawls, by means of which the end of each wire can be drawn up to give any required tightness. By careful attention to the erection of these wire fences, and especially of the straining-posts, they are rendered very desirable, and are kept in perfect condition with very little trouble; but probably nothing will fall more quickly out of condition than a wire fence of imperfect design, and put up with little painstaking or attention. In most of these fences a small wire rope is placed at the top and single wires below, the height of the fence and the number of wires being varied according to the use to which the land enclosed may be put.

In a very few instances, fences made of iron bars are used, sometimes built in sections of 10 feet or 12 feet each, and bolted together. The upright posts are $1\frac{1}{4}$ by $\frac{3}{4}$ inches, and the horizontal bars $\frac{1}{2}$ of an inch in diameter. These bars are slipped through the upright placed at the center of each section of 10 or 12 feet, and a burr is raised with a chisel on the round bar on each side of this upright, so that it is firmly held. The ends of the horizontal bars are fitted into holes drilled in the end uprights and are riveted in, so that the end uprights or parts of two adjacent sections of the fence may be placed close against each other and held by two $\frac{1}{2}$ -inch bolts. The foot of each post is pointed, and is also fitted with a sort of side spur, welded to it sometimes on one side only, and reaching out horizontally 8 or 10 inches, and then downwards into the ground to the same depth as the post itself, so that when each post has been driven into the ground 12 or 14 inches, it is very firmly braced by the side spurs. The upright, which is placed at the center of each section, is often made with this same side-spur, but not always. It would seem that this iron fence is made in this way, in detached sections or bents, for the sake of convenience of transportation in the complete state, ready for fixing in place, and for this purpose it is well designed.

Another form of iron fence, used perhaps more upon private roads or estates than on railway lines, is worthy of notice both for its permanence and simplicity of construction, but hardly any fence made of iron bars can be called cheap. In this form of fence each upright or post is a straight bar of iron $1\frac{1}{4}$ by $\frac{1}{2}$ inch, placed with its flat side across the line of the fence, and fixed in a block of stone which is sunk into the earth just far enough to allow the turf to grow with certainty above it. These posts are placed 4 feet apart, and in each are cut or punched oblong holes 1 inch by 5-16 inch, through which pass the bars that form the rails of the fence, and these bars are 1 inch by $\frac{1}{4}$ inch. In every third post the holes are $1\frac{1}{4}$ inch by 9-16 inch, and the end of one bar is slightly offset to allow the other to slip into one of these holes by its side, and the ends of both bars are then held fast by a little wedge driven in beneath them.

On nearly all the viaducts and bridges a parapet or wall of some kind is put up. With the ordinary brick viaduct, so common in cities, a plain brick parapet wall is built, generally with the least possible amount of ornamentation either in outline or finish. Sometimes a stone coping is put on and sometimes the brick blocks already spoken of are used. When, as in many parts of the country, stone bridges are built, then the parapet walls are usually of stone and more ornamental in their design. Occasionally on an iron bridge a sheet-iron guard or railing is placed at the sides, with cast-iron posts, and sometimes these posts will be used with chains stretched between them.

Many girder-bridges are used in which the track is carried on beams resting on the lower flanges of the girder, and in such cases the girder itself forms a parapet or railing. On some of these bridges the girder is board-

ed up flush with the edge of the flanges and side-stiffening plates, for the sake of greater neatness of appearance.

There are very many level crossings of highways on farm roads upon the railways, although the great majority of such roads are carried at almost any sacrifice that can be made at all, either over or under the railway, so that all chance of collision of trains with passing teams, and of animals straying upon the line, is avoided. Thus the London & Northwestern Railway may be taken as an example of a line most carefully guarded in this respect, and yet on this line, from Liverpool to London, about 200 miles, there are 159 level crossings of roads and paths*. Sixty-four of these crossings are of roads fairly within town or village limits; 60 are of farm roads, probably very rarely used, and 35 are of foot-paths along which no vehicle or animal could pass.

Besides these level crossings there are no less than 367 bridges by which roads pass the line, and of these 367 there are 147 on which the line passes over roads, and 220 by which the roads are carried above the railway. If to these bridges be added 50, both great and small (and a few are quite extensive), by which the railway is carried over a canal or a water-course, the total will be found to be 576, or very nearly three to a mile for the whole distance. This fact shows one of the disadvantages under which railway builders here have worked, in that the whole country is so filled with roads and passways, all of which must be left unobstructed when the railway works are finished. The question very naturally arises, why are not some two or three of these roads lying near each other merged into one at or near the railway so as to pass it by a single bridge? and the answer is that this diversion of a road, even if it be plainly to the interest of all concerned, is not permitted by the law of the land, unless a special provision for each individual instance has been first made in the bill or charter granted by Parliament. In general, too, the opposition by those who think their interests are endangered, when any such proposal is made before Parliament, is so great that the roads are left without being diverted in the least, and they, hence, cross the line, or the line crosses them, upon a bridge, which in very many cases, perhaps not a majority, is built upon the skew.

The custom of maintaining foot-paths also in directions which would naturally be thought highly injurious to the property over which they pass, is at first quite hard to understand; but when it is known that this or that path may have existed, and have been in common use, from a very early day, before any one whosoever could lay any claim to an exclusive right of property in the adjacent fields, the seeming absurdity vanishes, although the disadvantage to the owner of the land may remain.

These crossings are mentioned in this connection only to call attention to the very complete arrangements that are made, wherever, as for all these crossings, any openings must be made in the fences, for maintaining a perfect protection of the line from intruders. At all road-crossings a very substantial wooden gate is erected in the fence on each side of the line, and upon all highways a gate-keeper is stationed who opens the gates only when some person requires to pass through.

On the gates at farm-roads a notice-plate of cast iron is fixed, usually upon the top bar or rail, and on it is "Shut this Gate," in 3-inch raised letters painted black, the plate and the wood work of the gate being usually white.

Sometimes a printed notice, showing the rules of the company for preventing trespassing upon the line, is fixed to a board upon the gate, and a sign-board is put upon a pole just inside the gate with a notice to the same effect, in large letters.

In many cases in the flat fen country, as in the counties about Cambridge—a country wonderfully like some of the Western river bottoms for flatness—the gates that are put up in towns to guard the railway-crossings, one at each side of the track, are connected by arms fixed to the upright axis upon which each gate swings, and rods that pass underneath the surface of the ground, so that by one keeper both gates can be opened at the same moment.

Where the foot-paths pass the hedges or walls a sort of X shaped stairway is used so that any person must ascend three or four steps, and thus, as it were, get over the hedge or wall. Sometimes a turnstile is employed, but a more common plan is to place a small gate so that it swings between the extremities of a very short C shaped piece of fence or paling, so that one person

only, or at most two, can pass it at a time. At all the crossings of foot-paths a strict caution against trespassing upon the line is put up, the supposition in this case being plainly that merely to walk across the tracks is not a trespass, but to remain upon or to walk along them would be, and it is this only that is forbidden.

In conclusion, it may be said that the system of fencing and enclosing the lines here is very complete, and that the greatest attention is given to maintaining the fences, hedges and walls in a perfect condition. One result of this constant attention is the almost absolute freedom of the English lines from accident or loss arising from any trespassing upon the railway premises either by man or beast, and, to put the matter in a little different light, the practice of so many of the new lines in the United States of leaving the track for months after its completion, either with imperfect fences or with none at all, would be viewed here with the most profound misgiving if not with contempt by all concerned, from the manager of the line down to the humblest track-man, and from the well-to-do shareholder, who rides first-class, down to the commonest traveler, who buys his corduroys once in ten years and never owns more than a single pair at a time; and to ride, as many have done in the West, for hours at a time, with the engine whistling fully one-fourth of the way to keep the cattle at least in motion, if not to drive them off the track, is an entertainment unappreciated here because absolutely unknown.

AXONOMETRICAL DRAWING.

CHICAGO, July 12, 1871.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your numbers of June 3 and July 8, I notice articles on *axonometrical drawing*. Will you allow me to give a few words of explanation about that kind of drawing, if you think it not an infringement upon Mr. Gartner's privileges?

Isometrical drawing is one mode of *axonometrical drawing*, and is analytically given in the first line of Mr. Gartner's table, page 112, June 3, of your paper. Its application to construction is illustrated in the annexed cut, No. 1, representing a regular cube. Draw

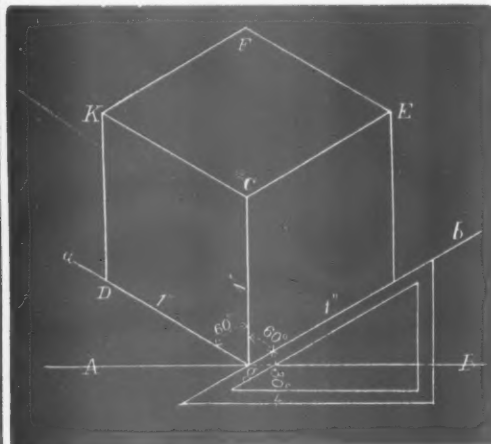


Fig. 1; Isometrical.

the line AB , and at g elevate a perpendicular. (I will here ask Mr. Gartner if the line cg in his diagram ought not to be perpendicular, and also if the third line, first column of his table ought not to read $2b$, and the eighth line, same column $3b$?)* From the column headed *alpha* in said table, first line, take 60° and make the angle ega equal to it—or rather take a 30° triangle as usual and draw the line ag corresponding to same line on Gartner's diagram; draw gb in the same way from column headed *beta*, and we will be ready to build our cube. From column ga , take the figure on the first line, which is 1, and means one entire length of one side of the cube, which you put along the side ga , say to D ; take also, in all cases, one full length for gc , and from column gb take 1, meaning also one entire length, along gb . Then proceed to draw the lines CK and FE parallel to ag , and also KF and CE , parallel to gb . The above gives a cube drawn *axonometrically* by the isometrical process.

We will build now the same cube *axonometrically* by the *dimetrical* process. Let us take for this construction the entire 4th line of Mr. Gartner's table, commencing by $2c$ in first column. Draw (see fig. 2) the same base line, AB , and elevate same perpendicular, gc , as in Fig. 1. From column *alpha* (4th line) take $88^\circ 13'$ and with it describe the angle ega ; or from the first of the two columns under the title of *approximates*, take

1-32, which means that you should take 32 parts on the horizontal line gm and one part for the vertical projection mn . The line drawn from g to n will correspond with the line ga . This shows that we can find the direction of the line ga from either of the columns

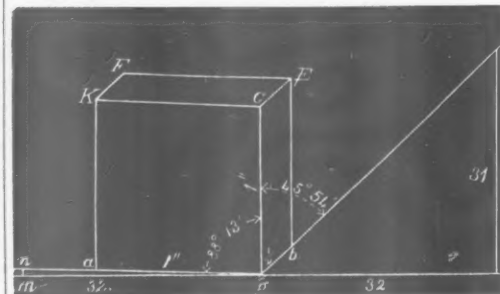


Fig. 2; Dimetrical.

alpha, and *alpha* in the *approximates* column. The direction of the line gb is found in the same way from the column *beta* $45^\circ 54'$, and also from *beta*, the second column of *approximates*, indicating 31 parts to be taken on tangent and 32 parts on base. The length of the side ga is now taken from the column ga as one full length, and gb from column gb as one-fourth of the actual length, which gives point b . Now build the entire cube by parallels as before, through K , F , C and E , remembering that the vertical heights have always their actual length.

We will now, and lastly, proceed to build the same cube *axonometrically* by the *trimetrical* method, which is taken from the last line of the table or 3 *c*.

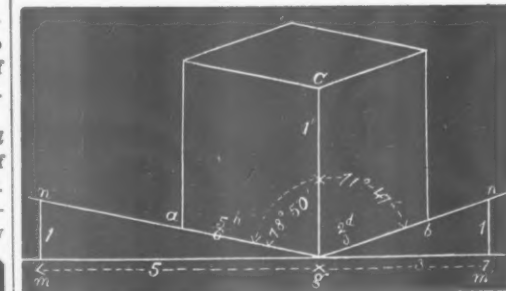


Fig. 3; Trimetrical.

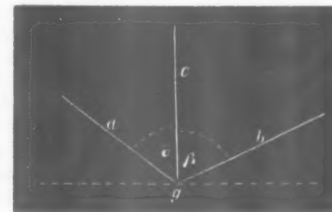
Base and perpendicular same as before, $ega = 78^\circ 50'$. From column *alpha* of *approximates* we take five parts from g to m , and one part from m to n . To get the direction gb , we make $egb = 71^\circ 47'$, or from column *beta* of *approximates* we take three parts from g to m' and one part from m' to n' . From column ga we take five-sixths parts of the real length of same side of cube and make ga equal to those parts. Also from column gb we take two-thirds parts of the actual length of corresponding side of cube and make gb equal to it; then we finish the figure as before.

It will be seen from the above that *axonometrical drawing* (if we are allowed for one moment to reverse the parental order) is nothing but a simple series of modifications of *isometrical drawing* and *parallel perspective*. If these two last branches have made their way in this country before their twin sisters, it is because they are more useful to the mechanic, as the real working lengths can be easily measured from them. It will be readily seen from the annexed cuts that if the *isometrical* mode is more advantageous to the mechanic, it shows, however, very clumsily any machine it represents, whilst the *dimetrical* system shows the objects nearly in perspective, and, consequently, nearer to their true aspect.

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P. S.—After this article was written, our assistant, C. Wagner, C. E., was directed to verify the correctness of the table given by Mr. Gartner, and he discovered



Mr. Gartner's Diagram Corrected.

several little mistakes, probably typographical errors, so we concluded to annex here a true table. Students would do well to work out the other examples given in the table.

*These were counted with note-book and pencil in hand the whole way and are very near the truth. The numbers should be slightly greater as a few are known to have been omitted.

*Doubtless they ought. The errors were in the engraving and printing.—ED. RAILROAD GAZETTE.

TABLE FOR AXONOMETRICAL DRAWING.

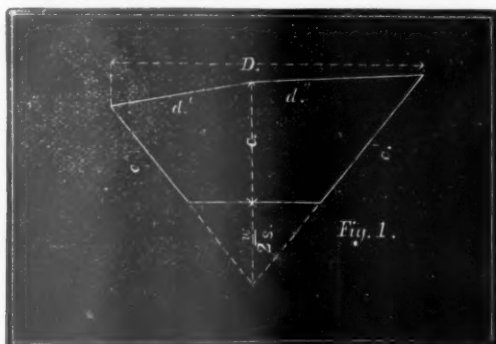
1.	2.	3.	4.	5.	6.	7.
	<i>g a.</i>	<i>g b.</i>	<i>Alpha.</i>	<i>Beta.</i>	<i>Approximate.</i>	
1	1	1	60°	60°	<i>tang</i> (90°- <i>a</i>)	<i>tang</i> (90°- <i>b</i>)
2 a	1	1-2	82°49'	48°25'	1-5	7-5
b	1	1-3	86°49'	46°36'	1-18	17 18
c	1	1-4	88°13'	45°54'	1-32	31-32
d	7-6	7-8	65°23'	65°23'	5-11	5-11
e	3-4	3-4	75°58'	75°58'	1-4	1-4
3 a	9-10	1-2	84°49'	71°24'	1-11	1-3
b	23 24	1-3	87°45'	69°44'	1-25	3-8
c	5-6	2-3	78°50'	71°14'	1-5	1-3

[Mr. Gartner's article on axonometrical drawing seems to have proved a puzzle to many educated American engineers and draftsmen, to whom the name if not the thing was quite unknown. We are glad, therefore, to present an explanation, especially one so clear and from so high an authority as that of Professor Vander Naillen.—ED. RAILROAD GAZETTE.]

A DIAGRAM OF SECTIONAL AREAS OF RAIL-ROAD EARTHWORK.

The multitude of devices, of more or less merit, for computing railway earthwork, are an evidence, if any were needed, of the onerous nature of the work and acceptability of any relief. The following contribution to this end, by taking off sectional areas directly from a diagram, without computation from field-notes kept in the usual manner, is offered to the judgment of engineers.

In any cross-section let



c — the center cut,
 c' and c'' — side cuts,
 d' and d'' — D — width on surface,
 w — width of road-bed,
 s — ratio of slope, 3-2, 5-4, etc.,
 A — area.

Then the area will be given by the equation :

$$A = \frac{D(c + \frac{w}{2s})}{2} - \frac{w}{4s}, \text{ or}$$

$$A = \frac{c}{2} D + \frac{w}{4s} D - \frac{w^2}{4s} (1).$$

It is evident that letting $A = A_1 + A_2$ equation (1) is equal to the sum of the two equations

$$A_1 = \frac{c}{a} D(2), \text{ and}$$

$$A_2 = \frac{w}{4s} D - \frac{w^2}{4s} \quad (3),$$

both of which are the equations of straight lines, taking A and D as the variables y and x respectively; and that the value of equation (2) is independent of the particular road-bed and slope, and that of equation (3) of the depth of the center cut. Consequently, if, laying off successive values of D along the axis of x , and of A along the axis of y , we plot equation (2) above the axis of x for successive values of c , and equation (3) below it for the different combinations of values of w and s which occur in practice, we obtain a diagram from which the area of any cross-section of any variety of road-bed and slope can be obtained, by scaling along the line $x = D$ from the line above the axis of x representing the given center cut to the line below it representing the given combination of a road bed and slope. Such a diagram, giving areas for any kind of railway earthwork having regular slopes, has been constructed and used, but involves considerable labor and care in drawing, and to be of practical use should be engraved. The object of the present paper is more to give the practical details of construction for a simple modification which is applicable to but one combination of road-bed and slope, but dispenses with the use of the scale and can be drawn on a sheet of cross-section paper in three or four hours, with very little calculation.

We will suppose a diagram is required for a road-bed of 14 feet and slopes of $1\frac{1}{2}$ to 1, on a sheet of 16×2 engraved cross-section paper graduated to tenths of an inch. Lay off along the bottom of the sheet successive values of D to a scale of 2 feet to 1 inch, the fine lines thus representing differences of 0.2 in the value of D . If we begin at the smallest possible value, 14, the last given will be 64 feet. Also lay off up the sides of the

sheet successive values of A to a scale of 50 feet to an inch, the fine horizontal lines thus representing differences of 5 feet in area.

Now take $D = 50$ and solve equation (1) for the case $\epsilon = 0$. The first member disappears and we have $A = \frac{c}{D} - \frac{c^2}{4a}$ — 84 (4). Lay off 84 on the diagram on line $D = 50$. Perform the same operation, taking $D = 20$, when it is found $A = 14$. Lay off 14 on line $D = 20$, and through the points thus found draw a straight line,

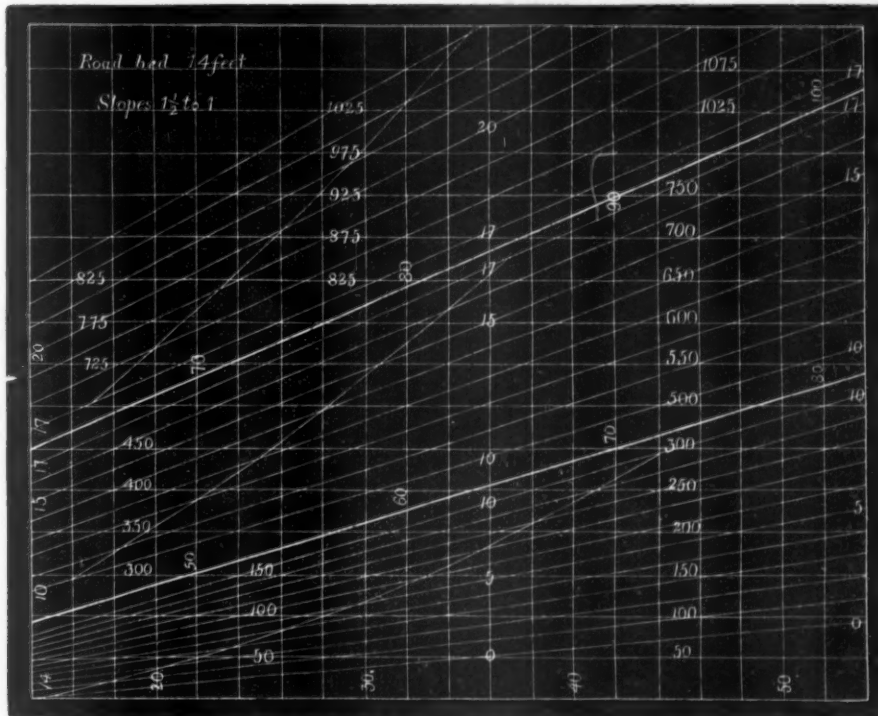


Fig. 2.

which will also pass through the point $D = 14, A = 0$. The remaining work is almost mechanical, for since the value of c only affects the first member of equation (1), if $c = 0.2$ equation (4) becomes $A = \frac{0.2D}{10} + 84 = 5 + 84$, if $c = 0.4$ it becomes $A = 10 + 84$, etc., increasing by $\frac{D}{10}$ for every increase of 0.2 in c . Lay off then on line $D = 50$, successive values of c varying by 0.2, i. e., 89, 91, 93, 104, etc., up to say $c = 10$ feet, and in the same way on line $D = 20, 16, 18, 20, 23$, etc., and passing straight lines through the points thus found the diagram is complete to 10 feet.

But in continuing for cuts of more than 10 feet, the smallest value of D likely to occur in practice is about 42 feet, so that it is superfluous to give smaller values on the remainder of the diagram. Accordingly, draw a heavy line just above and parallel with line $c = 10$ and lay off along it new values of D running from 42 to 82. Solve equation (1) again with $c = 10$ and $D =$ say 50 and 80, and—letting the horizontal lines represent new values of A as found convenient—plot the result.

Then proceed as before, laying off $\frac{D}{10}$ successively up to say 17 feet, when a new heavy line is drawn, new values of D laid off, say from 62 to 102, and proceeding as before the sheet is completed, extending up to 22 feet for any variety of surface. In continuing for higher values of c on other sheets, take the 16-inch side as the axis of x and lay off $\frac{D}{20}$ for single tenths. The method is otherwise the same.

It is well as a check to lay off values of c on one or more intermediate lines, and a smooth and unwarped sheet should be selected. Lines representing even values of c should be made prominent, and values of all the lines put at convenient intervals over the face of the diagram.

The diagram proper being finished, the "curve of level section" should be drawn on, that is, the curve of the equation $A = we + e^2 s$. This can be done without calculation, by considering that in a level section, if e be increased by 1, D it increased by $2s$. Thus in the diagram described, the curve will pass through the points, $e = 0, D = 14$; $e = 1, D = 17$; $e = 2, D = 20$, etc.

As a practical example, required the area of the following cross-section :

$$\frac{13.0}{-4.0} = 7.2 \quad \frac{34.7}{-11.8}$$

Taking at the bottom of the sheet the line $D = 37.7$ ($18.0 + 24.7$), follow it up till it intersects the inclined line $c = 7.2$. Place the needle-point there and read off the horizontal lines the area = 191 feet.

Required the height of an equivalent level section to the above. Follow horizontally the line $A = 191$ to its in-

tersection with the curve of level section and read off the height required from the inclined center cut lines, — 7.55. Suppose, by error, 7.2 above given 9.2. The point of intersection found will then lie above and within the curve of level section, its position indicating that the center height is disproportionately great. The query at once arises whether this is correct. The ratio of c to D is always indicated by the relative position of the point obtained, and errors will thus be

often detected which in computation would pass unnoticed. Areas are easily taken off to the nearest half foot if desired.

When intermediate side levels are taken it will be found most convenient to take off the area as usual, and plot the surface lines only, to obtain the proper correction.

The statement is ventured from practical experience that no engineer with a completed estimate, however well checked, of 5 to 20 miles, can check his areas from the diagram without finding a few errors. The trial can be made in a few hours, as by actual count 1,008 cross-sections, extending over six miles, have been taken off with ease in 2 hours and 40 minutes.

A very great improvement, by Mr. Charles A. Smith, C. E., Assistant Professor of Civil Engineering in Washington University, would be to construct the diagram to give areas multiplied by the factor $\frac{100}{64}$, when the solidities for full stations are given by simple addition. The scale of $A \times \frac{100}{64}$ should then be 100 to an inch instead of 50, and values c should be laid off on lines $D = 54, 27$, etc., to avoid fractional increments. It will be seen that the scale of A proper is not appreciably changed and the next longest and most tedious step in earthwork computation is thus passed over without any additional work. It only remains to add together results and take the proper fractional parts to obtain "End Area" solidities.

This diagram is one of a series by Mr. Smith and myself, in which areas of side-hill cross-sections, correction of "End Area" solidities by the prismoidal formula, correction for excavation on curves, etc., are provided for.

ARTHUR M. WELLINGTON,
Asst. Engineer, B., N. Y. & P. Ry., Arcade, Wyoming County, N. Y.

—A telegram from St. Louis, dated the 12th, says: "Colonel Maguire, Tax-Collector, to-day levied on depot, offices, rolling-stock, lot of railroad iron, and other material belonging to the North Missouri Railroad Company for non-payment of taxes for the past three years, amounting to \$116,000. The passenger train was not interrupted, but freight trains were prevented from leaving. The officers of the road claim that they were exempt from taxation, but, the assessment having been made, and the bills having been placed in the hands of the Collector, and payment refused, he had no other course than to levy on the property."

"The Missouri, Pacific & Iron Mountain Railroad will be closed to-morrow. Also the main docks and Kingsland Iron Works, in South St. Louis, all of which claim exemption—the two latter by virtue of an ordinance passed by the former city of Carondelet, in the boundaries of which they are situated."

—England is importing railroad ties from Russia.



PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, if not previously published, FREE OF CHARGE. They are invited to send us drawings or models and specifications. When engravings are necessary, the inventor is expected to furnish his own engravings, or to pay for them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Engineering and Mechanics.—Mr. M. N. Forney, Mechanical Engineer, whose office is at Room 7, No. 72 Broadway, New York, has been engaged as Associate Editor of this journal in charge of these departments. He is also authorized to act as our agent.

CHICAGO AND MILWAUKEE.

The Chicago & Northwestern Railway lines are in large part in the State of Wisconsin, and planned to carry traffic to Chicago; the Milwaukee & St. Paul Company's lines traverse principally the same State, but have their eastern terminus at Milwaukee. The systems are intended to carry the traffic of the same or adjoining territories, but to different ports. Of course towns on the Milwaukee Company's lines have more or less business with Chicago, and those on the Chicago Company's lines with Milwaukee, and in many places the lines so run as to be available for a greater or less distance for either place. Still, the systems are such that it is for the interest of the one to carry everything to and from Chicago, and the other to work for Milwaukee. They have been rivals for business, it is true, but only to a limited extent for that traffic which could not be diverted from one of these lake ports to the other. Carrying to Milwaukee is regarded the legitimate business of one; carrying to Chicago of the other. The Chicago & Northwestern is dependent upon the Milwaukee & St. Paul for an outlet to Milwaukee; the Milwaukee & St. Paul upon the Chicago & Northwestern for an outlet to Chicago.

It must not be inferred, however, that except in the differing importance of their eastern termini as traffic centers these two systems are equally well located. One very striking difference is that the Milwaukee & St. Paul has no connection with railroads to the East, except over its rival's road. It is not only cut off from Chicago, but from all the world east of Lake Michigan. This is a vital defect in its system. There was a day when the lake was a sufficient outlet; but that day is long past. Passengers will go only by an all-rail route, and many important articles of freight always prefer the rail to the water route. The efforts to send the Milwaukee business across Lake Michigan to the Detroit & Milwaukee Railroad have had but limited success. People refuse to consider the crossing of Lake Michigan, where it is eighty miles wide, as a mere ferry, and since they refuse to cross the lake the only alternative is to take them around it, that is, through Chicago; and through Chicago for many years the great bulk of the passengers and express and fast freight moving between the East and the territory west of Lake Michigan have passed. It may not be necessary for every railroad in this territory to have a direct connection with Chicago—though it is

of immense importance to the railroad—but is sufficiently evident that a connection with the East is indispensable. So far, as we have said, the Milwaukee & St. Paul could reach neither Chicago nor New York except over the lines of its great rival.

Meanwhile, the preparations for competition between the two systems have been increasing. The Northwestern is pushing forward a line which will give it access to St. Paul and its railroad in Minnesota, for which, heretofore, it has depended upon the Milwaukee road. All the passengers and freight which it receives for St. Paul and other Minnesota points it is compelled to forward for the largest part of the distance over its rival's road, unless it can persuade the travelers and shippers to submit to a transfer to Mississippi steamers. The possession of a line of railroad nearly 150 miles long in Minnesota has made it indispensable to the completeness of the Northwestern's system that it should have a line across Wisconsin to the Upper Mississippi. This line must necessarily become a competitor of the Milwaukee & St. Paul for all that part of the traffic or travel of Minnesota that goes to the East or to Chicago, and, as it will command the line all the way to Chicago, and can run cars through to this city and to the depots of the eastern roads, it will have a decided advantage in competition with a rival wholly dependent upon it.

This situation of affairs seems to be considered altogether insupportable by the managers of the Milwaukee & St. Paul, and we learn that they have finally decided to construct a line of their own from Milwaukee to Chicago, and to complete it this season, and that the whole amount of stock has already been subscribed.

The importance of this step is evident. It is not merely a branch constructed to convey produce to and merchandise from Milwaukee. It is rather an extension of its main stem to a new eastern terminus. Once in operation, it will no longer be for the interest of the company to carry everything to and from Milwaukee. That city will no longer be the terminus but a terminus, and the Milwaukee & St. Paul will be a Chicago as well as a Milwaukee railroad.

But this new road will be close to the line of the Chicago & Northwestern, nowhere, we understand, more than six or seven miles distant, and much of the way almost alongside. Of course it will compete for the business of the country on the line, and, what is more important, for the business between Chicago and Milwaukee. In this latter, it will have the great advantage of commanding all the lines from Milwaukee. Consequently it can throw obstacles in the way of the transfer of any business from its rival on the way to points beyond Milwaukee. It will, of course, give its own road to Chicago all the business from its own roads to Milwaukee—that is, at present, of all the roads to Milwaukee.

Now it is reported that the managers of the Chicago & Northwestern no more like the prospect of being cut off at Milwaukee than do the Milwaukee & St. Paul managers the prospect of being shut out of Chicago and cut off from the East. They have, therefore, already commenced the survey of a line from the new Madison & La Crosse road, at some point fifteen or twenty miles north of Madison, eastward by the most direct and practicable route to Milwaukee, and it is reported that such road will certainly be built if the Milwaukee & St. Paul persists in making a new line from Milwaukee to Chicago. This proposed line would be about 85 miles long—about the same as that of the other road. In connection with the Madison & La Crosse road, now in progress, it would make a new route from Milwaukee to La Crosse quite as short as and for much of the way but a few miles distant from the Milwaukee & St. Paul's line. It would also give the Northwestern a good connection to Milwaukee for all that part of its Wisconsin Division north of Janesville (that is, for all of it which has any considerable business with Milwaukee) and a fair one for its Madison Division; and, of course, it would enable the Northwestern to do business between Milwaukee and Minnesota quite as well as its rival, which now has undisputed control of that business. The local traffic of the proposed new line will hardly be sufficient to justify construction; but in that particular it will be likely to excel the new Milwaukee & Chicago line, as it will be generally a little farther from its rival, and will have a fertile farming country on both sides of it.

It may be said that such a line would make the Northwestern a Milwaukee as much as a Chicago road, and that Milwaukee would gain as much from this as Chicago from the other line. But this is hardly true. It would remain the interest of the Northwestern to take everything through to Chicago. While it could serve Milwaukee as a terminus, it would be better for its business to make it a way station. Not that the company is likely to discriminate in favor of

or against either city, but that it will be natural for it to try to carry its traffic as far as possible.

It certainly seems to be a great waste of capital to construct these two new lines to do the work which existing roads are fully able to do. But such expenditures are unavoidable under our American competitive system. If they are built the two companies will be prepared to compete with each other for nearly all the business between Minnesota and Wisconsin, and Lake Michigan.

THE FAIRLIE SINGLE BOILER LOCOMOTIVE.

The engraving which we give herewith represents a "double-bogie" locomotive designed and built by A. McDonnell, Esq., Engineer of the Great Southern and Western Railroad of Ireland, at the company's works, Inchcore, Dublin. As will be observed, the engine is built upon what is now called the Fairlie system, i. e., with two trucks or "bogies." The driving-wheels and cylinders are attached to a separate truck-frame and turn on a center-pin, which is clearly shown in each view. This enables the wheels to adjust themselves to any curve on which the engine may run, and to go equally well either way.

This plan of engine, with single boiler and driving truck, obviates the great complication which on this side of the Atlantic has been almost universally considered the great objection to Mr. Fairlie's locomotives with double boilers and two sets of driving wheels and cylinders. That such engines would run more steadily, that they would pull heavier trains, and in proportion thereto would be less destructive to the track than any other engines now in use, we have found few engineers who doubt. But they may do all this and yet not be economical for general use. The simplest locomotive now running is a complicated machine and more prone to disorder than the human body, and so great are the inconvenience and expense which attend these disorders, that it is now almost impossible to introduce any invention, no matter what its advantages may be, if it increases the complication of the machine. As an example, we find that the almost universal verdict or practice with reference to the combustion of smoke—notwithstanding the annoyance and loss which attends its non-combustion—is, that it does not pay to use any of the contrivances which are employed and which do accomplish that purpose, simply because they increase the complication and liability of the boiler getting out of order, and thus increase the cost of repair. So of equilibrium, slide-valves, super-heaters, elastic tires, and other inventions. It is not because these things do not work well that they are not used, but because with them the engine is so often unserviceable.

If all the parts of a locomotive are duplicated, there will be just twice the danger of its being accidentally disordered. If, in addition to the duplication of all its parts, greater complication is added, it can easily be seen that the frequent interruptions and expense which would be incurred in keeping it in repair, not only might, but probably would, make it a very expensive engine to operate, which would more than offset other advantages.

The locomotive which we illustrate is, however, not open to any of the objections due to a duplication of parts. It has but one set of driving-wheels, cylinders and valve-gear; only one boiler and water-tank, and with the exception of the additional parts of the driving-truck frame and its connections, the whole machine is simpler than an ordinary locomotive and tender.

Another very serious objection to the double-boiler Fairlie locomotive is, that the only space for the fireman and engine-runner is that between the boiler and the cab. Now, with a boiler-shell 48 inches in diameter say, and a cab 9 feet wide, there is a space less than 30 inches wide on each side for the two men and all the reversing gear and appliances for operating the engine. This is so great an evil that it will always be a very serious obstacle in the way of such locomotives being popular with the men who run them. With the single-boiler engine this evil is entirely obviated. The foot-board is as wide as the cab, and the longitudinal space between the boiler and the tank can be made as great as is desirable. There will be plenty of room to handle a shovel, and space enough for both the locomotive-runner and fireman.

Probably most of our readers will be struck with the similarity of this plan of Mr. Fairlie's and that of Mr. Forney—illustrated in the RAILROAD GAZETTE of November 12 of last year. Both have the following important features in common:

1. The whole weight of the boiler and machinery, which is constant, is carried on the driving-wheels.
2. The water and fuel, whose weight is variable, are carried by the truck or bogie.

8. They have a long and flexible wheel-base, which gives the requisite steadiness to the engine when running fast or on a rough road.

The chief difference between them is that the driving-wheels of the engine we illustrate herewith are attached to a separate frame and can vibrate around a center pin.

For locomotives which must run both ways on a crooked road, the double trucks have important advantages, as it permits the leading wheels—no matter in which direction the engine is running—to adjust themselves tangentially to the curves. Running an ordinary eight-wheeled American locomotive backwards at a fast speed on a crooked road is always dangerous, and destructive to both the driving-wheel flanges and the rails. With a "double bogie" this would not be the case, as the driving wheels are then just as flexible laterally as are those on the ordinary leading truck. On a straight line or one with very little curvature this is not important, even if the engine is required to run both ways.

It gives us pleasure to submit the following letter concerning the performance of their engines to our readers:

"GREAT SOUTHERN & WESTERN RAILWAY.
"LOCOMOTIVE ENGINEER'S OFFICE, INCHICORE, DUBLIN,"
"July 19, 1870."

"Dear Sir—In reply to your inquiries as to the two double-bogie engines built in these works on your system, one has run 5,677 miles and the other 3,867 miles. They both worked as pilot engines when turned out new, and afterwards as passenger engines with slow trains; the average running speed of the trains they work is from 25 to 30 miles an hour, and the load from 4 to 9 of our large 6-wheeled carriages.

"The weight on the wheels is well distributed, being 10 tons on each pair of wheels of the steam bogie, and 8 tons on each pair of wheels of the trailing bogie in working order, with water enough to run from 20 to 25 miles, and coal enough for the run from Dublin to Cork (165 miles.) The engines make steam extremely well and the consumption of coal is low. The drivers consider it 3 or 4 pounds a mile less than the average. I will, however, let you know more exactly soon, when they have worked longer as train engines. The engines work very freely, run very steadily, and are very handy. They have given no trouble, except a little with the steam pipes, which I made at first without any joints, but altered since.

"They will run round curves of 100 feet radius, and run freely round curves of 300 feet radius, which is all I require them to do in practice.

"Yours truly,
"A. McDONNELL.
(Signed)
"R. F. FAIRLIE, Esq."

The Illinois Railroad Commission.

The Illinois Railroad and Warehouse Commissioners met in this city last week to decide upon the first steps to be taken in the discharge of their duties. They organized by the election of Gustavus Kerner as chairman. Governor Kerner is very widely known among the influential men of the State, is an able lawyer, and will be likely to be cautious in deciding upon a policy and vigorous in executing it. (His age was misstated as seventy years, in announcing his appointment; he is but just turned sixty.)

The temper of the Commission may be best gathered from their first circular to the railroad companies, which we published last week. Those who supposed that they could have no other object than to run amuck among the railroad companies may be disappointed. But the Commissioners understood that they may be most valuable to the State by collecting the facts which will serve as a basis for intelligent and effective legislation, and that when there is a dispute as to the interpretation of any statute, the question must be decided, as all such questions are, by the judicial tribunals. We understand that the railroad companies generally show a disposition to supply cheerfully all the needed information, and to give the Commissioners all desired facilities for making investigations, and we hope there may be no exception to this conduct. The railroad companies may not accept all the laws passed to regulate their business as valid, and on some points they may come in conflict with the Commissioners; but they will lose nothing—we believe they will gain much—by any general dissemination of knowledge concerning the nature of their business. By far the largest part of the unfriendly legislation concerning railroads, and nearly all of that which is oppressive, is based upon misconceptions and misunderstandings, which, it is to be hoped, this commission will do much to remove. The truth about the very complicated business of transportation, especially in a country like this, where competition is the rule, is very hard to reach, even by men engaged in the business. Men whose business it is to be familiar with the business of all the roads of a State, ought to be able, not only to do something towards dispelling the popular ignorance on this subject, but also to increase the sum of our common

knowledge, and give the railroad companies information, heretofore unattainable, which may lead to improvements in their methods of doing business.

The Last Acquisition of the Pennsylvania Company.

It is announced that the Jeffersonville, Madison & Indianapolis Company's road has been leased to the Pennsylvania Company for 99 years, from August 1. This road extends from Jeffersonville, Ind., opposite Louisville, a little to the west of north to Indianapolis, 106 miles, with a branch from Columbus southeast to the Ohio River at Madison, 45 miles, and another branch from Jeffersonville down the Ohio to New Albany, six miles. It has also the use of the Louisville Bridge, and a line from Jeffersonville into the city of Louisville, two miles, and a lease of a line 65 miles long (owned by three different companies) from Columbus northeast through Shelbyville and Rushville, on the Pan Handle Line, 53 miles east of Indianapolis. For some time cars have run through between Louisville and New York by this route, and the main line forms the chief entrance into Louisville from Chicago and the north.

The Madison Branch of this road is not particularly valuable, yet the gross earnings of the line owned by the company were nearly \$8,000 per mile in 1870. The earnings of the leased line for the same year were little more than \$5,000 per mile.

Another route from Louisville eastward, the Louisville, Cincinnati & Lexington Railroad, is understood to be largely controlled by the Pennsylvania Company, which has been constructing the railroad bridge at Cincinnati in order to connect with it. It seems that the sole rival of the Pennsylvania Company in Louisville will be the Baltimore & Ohio, through its ally, the Ohio & Mississippi.

The Leavenworth, Lawrence & Galveston Railroad.

At the annual meeting of this Kansas company, held in Lawrence on the 5th of June last, the directors made their first report. This is a somewhat formidable document, since, being the first account of their property given to the stockholders, it was thought best to give a history of the enterprise and some documents appertaining to it.

This history is unusually interesting, as it traces quite minutely the vicissitudes of an enterprise begun some years ago almost in the wilderness, prosecuted at first feebly and uncertainly, and under the management of the present owners, vigorously and successfully, until now it seems to have become an exceedingly valuable property, likely to render a very large profit to its owners, although as yet the country on its line is but thinly peopled, and its own lands are but just brought into market.

The company was organized under a special charter from the Territorial Legislature in 1858 as the "Leavenworth, Lawrence & Fort Gibson Railroad Company," the name being changed afterwards. This charter gives the company authority to regulate its rates for transportation, and is considered more valuable than those now attainable under the general law of the State, whose present constitution prohibits special charters. The Supreme Court of the State has decided that the franchises granted by such special charters are vested rights, and irrevocable without the company's consent.

After the organization of the State of Kansas, the Legislature granted this company 125,000 acres of land, to be conveyed on the completion of ten miles of road south from Lawrence. This part of the road was completed in 1868, and the lands were then conveyed to P. F. W. Peck, of Chicago, who held them as security for money advanced for construction. When the present owners came into possession, in the fall of 1869, they discharged these obligations, and the land was deeded to the company by Mr. Peck.

In 1863 Congress granted in aid of this road the odd sections of public land on either side of the line for ten miles, with the right to select other odd sections within twenty miles in place of such as had been previously disposed of by the government. The same act of Congress and another passed a little later made a similar grant to the Missouri, Kansas & Texas Railway Company, whose line crossed that of this company at a sharp angle, and therefore was, for a long distance, within the belt of twenty miles which contained its grant. The grants thus were coincident in large part, and conflicting claims arose, which were brought before the Department of the Interior for settlement. The Commissioner of the General Land Office, in the summer of 1870, decided that the lands should be equally divided, but an appeal was taken to the Secretary of the Interior, by this company, pending whose decision a compromise was made by the two companies, by the terms of which the Leavenworth, Lawrence & Galveston received three-fourths of the odd sections in conflict. On this basis the lands are now being divided.

The whole amount of land received from the General Government will be very nearly 416,558 acres. Of these, there is a conflicting claim for about 10,000 acres between the company and settlers.

Of the State lands, about 80,000 acres of those most distant from the line were sold in May, 1870, for two dollars an acre. The remainder, together with the national grant, amount to about 461,558 acres, among the very best agricultural lands of

Kansas or the West, consisting of rolling prairie, well watered, with better timber than is common near Kansas prairies, and considerable deposits of coal at various points on the line of road. These lands were put in the market last month, and it is believed that they will meet with a ready sale, as the State is growing rapidly. An example of this is the county of Montgomery, through which the southern part of this road will pass. This county increased in population from 500 to 11,000 during the year 1870, and already every quarter-section of value is occupied.

The lands are offered on terms likely to attract settlers of limited means. The only payment required in advance is interest at 7 per cent. to the first of January next after the sale. At that time the interest on the principal for the next year is required, and not until the second January is an installment of one-sixth of the principal required, at which rate per year the debt is to be paid. The average value of the lands is estimated at eight dollars an acre, and with the town lots at stations, of which the company is a large owner, it is believed that the average value of its lands in market will not be less than ten dollars per acre.

The company received from the counties on the line subscriptions of their seven per cent. bonds in aid of construction, amounting in the aggregate to \$1,050,000, the validity of which has been affirmed by the Supreme Court of Kansas, and the interest on which, so far, has been promptly paid.

Up to the summer of 1860, 28 miles of the road, from Lawrence south to Ottawa, had been constructed by Sturges & Sons, of Chicago, then the principal owners of the property. It was purchased by the present owners in September of that year, for \$631,109, which was given as the actual cost of the property. It had heavy grades, light (45 pounds) iron, and scarcely any rolling stock.

"From September, 1860, to December, 1870, the road was extended southwardly from Ottawa to Thayer, a distance of eighty-two miles. This portion of the road has been constructed in the most substantial manner—laid with ties of durable timber and with iron of first quality, and fifty-seven pounds to the yard. The culverts and bridge-piers are of masonry, and the road is in all respects thoroughly well constructed, and for a new road is of the first-class, better than most Western roads.

"The road from Ottawa to Thayer has cost about \$1,886,000. The crossing of the Pottawatomie River was found to be somewhat difficult and expensive, increasing very considerably the aggregate cost of this section of the road.

"The line of road is nearly straight. There are few grades of magnitude, and none of them exceeding forty-five feet to the mile.

"There are, between Lawrence and Thayer, sixteen stations. At Lawrence and Thayer, and the principal intermediate stations, there have been erected suitable and convenient passenger and freight houses, and water stations, so that no large expenditure, in this regard, will be immediately required."

Except a round house for four engines at Lawrence, furnished with some machinery, the company has no shop. Various towns on the line have offered to give the necessary land and with it from \$50,000 to \$75,000 in order to secure the location of machine and repair shops within their limits, and one of these will probably be accepted, as such accommodations are much needed. The only expense to be incurred by the company will be for machinery and tools.

After the transfer of the road to the present organization in 1860, it was extended from Ottawa to Garnett, 23 miles, by February 18, 1870. In 1870, 57 miles more were completed to Thayer, 108 miles from Lawrence. Construction was then suspended until congressional and legislative authority could be obtained for a change of location, so that the road might be continued from Thayer southwestward rather than southward, thus keeping further from lines previously constructed, accommodating a larger territory, and reaching more nearly to the routes of the Texas cattle. This authority was obtained, and the line has been located from Thayer southwestward across Montgomery County nearly in a straight line to the northern border of the Indian Territory near Coffeyville, a distance of 34 miles. This terminus is well located for receiving and shipping cattle, for the accommodation of which yards will be ready by the time the road is completed. The extension of the road to this point was commenced on the 1st of May and is to be completed by the 1st of August.

In the spring of 1870, when the construction of the Kansas City & Santa Fe Railroad from Olathe to Ottawa, 32 miles, was commenced, the Leavenworth, Lawrence & Galveston Company made a contract for a perpetual lease of the road, by which it has acquired a direct connection to Kansas City, "which is the great railroad center and commercial point upon and west of the Missouri River." By this contract the Lawrence Company received the stock of the Kansas City & Santa Fe Company, and also \$225,000 in 7 per cent. county bonds voted in aid of the road. The rental agreed upon is the payment of the interest of the bonds of the Kansas City & Santa Fe Company, amounting to \$730,000, bearing 10 per cent. interest. The Lawrence Company advanced the money for the construction of the road, which amounted to \$849,932.72, or \$201,932.72 more than was realized by the sale of the bonds, which last amount is held as a debt against the Kansas City & Santa Fe Company.

From Olathe to Kansas City the track of the Missouri River, Fort Scott & Gulf Railroad is used, and its tracks and stations in Kansas City are used in common. Additions to the accommodations at this terminus are to be made at the joint expense of the two companies.

It is hoped that an arrangement will be made with the Kansas Pacific Company whereby a bridge will be constructed over the river at Lawrence at their joint expense.

"The Company have purchased and have now upon its line of rolling stock: Engines, 16—all of the Manchester Locomotive Works' manufacture, except four; 145 covered cars; 100 flat and coal cars; 8 passenger coaches; 4 second-class or

smoking cars; 3 baggage cars; 4 mail and express cars; 4 way cars; 1 wrecking car, and the necessary hand cars; the total cost of which including machinery in repair shops, etc., as per Treasurer's report, has been \$498,789.71.

Four new engines from the Manchester Locomotive Works, costing \$12,000 each, have been ordered, and will be upon the road by the 1st of September.

The capital stock of the company is \$5,000,000. The company, to obtain money to construct and equip its road, have authorized the issue of its bonds to the amount of \$5,000,000, of the date of July 1, A. D. 1869, having thirty years to run to maturity, bearing interest at the rate of ten per cent. per annum, payable semi-annually, free of government tax, with both principal and interest payable at the Farmers' Loan and Trust Company, in New York City.

These bonds are redeemable by lot, at the expiration of five years from their date, at the option of the company, and are secured by a trust mortgage, executed by the company to the Farmers' Loan and Trust Company as trustees, covering its railroad from Lawrence to the south line of the State, with the equipment and other property, together with \$1,050,000 of county bonds above mentioned.

This mortgage also covers all the lands received from the State and General Government above mentioned.

Provision is made, however, for the sale of the county bonds, should the company at any time deem it advisable, and also for the sale and conveyance of the lands, as will be seen by the mortgage, a copy of which is herewith printed.

Of these bonds \$4,000,000 have been sold to the stockholders of the company at ninety per cent. With each bond there have been distributed ten shares of stock, making the capital stock thus far distributed, \$4,000,000.

The remaining \$1,000,000 bonds have been sold to the stockholders at the same rate, and to be issued as of the date of July 1, 1871, and interest adjusted accordingly. The remaining million of stock is to be distributed to the stockholders with the bonds, in the manner above stated. This last issue of bonds was found necessary to construct the bridge at Lawrence and complete and equip the road from Thayer to the south line of the State. On the first day of July, therefore, the funded indebtedness of the company will be \$5,000,000, equaling in amount the capital stock.

To recapitulate the available assets of the company:

Its Kansas City & Santa Fe Branch, from Ottawa to Olathe, 32 miles.....	\$649,932 73
County bonds, estimated at par value.....	1,275,000 00
461.58 acres of land and other real as- sets.....	4,615,580 00
	\$6,740,512 73
Its funded indebtedness, including issue of bonds to be made July 1, 1871.....	5,000,000 00
Bonds issued on K. C. & S. F. Branch, assumed by this company.....	720,000 00
	\$5,720,000 00
Balance.....	\$1,020,512 73

During the fiscal year which closed April 30, 1871, the average length of road open was 94 miles, and much of it was opened too late to market the products of the country. The gross earnings for this year were \$424,091.06, or \$4,511 per mile. The operating expenses were about 69 per cent. of this amount, or \$312,952.59. It is only reasonable to suppose that the earnings will increase very rapidly for some years.

It is estimated that the liabilities maturing and to be incurred the present year will amount to about \$1,400,000, \$748,000 of which will be for the extension, \$30,000 for the Lawrence Bridge, and \$100,000 for additional equipment. To meet this only \$216,700.02 will be required from the net earnings, which, at the present rate, will exceed that amount.

The above account of this road is mainly an abridgement of the report of the President, J. M. Walker, of Chicago. It will be noticed that the value of the bonds and lands subscribed in aid of this road, 174 miles long, is estimated at \$33,855, while the cost of road and equipment, so far, has been but \$36,450 per mile. It is true that bonds received from counties, though almost sure to be paid, principal and interest, could not, probably, be sold at par, and the land, though likely to bring the full estimated price, cannot all be sold for some years, and may not increase in value fast enough to make compound interest on the present valuation; still we have here a line for the construction of which a bounty of nearly eleven-twelfths of its cost was granted. With these munificent subsidies in bonds and lands, and the heavy traffic which the road is sure to have, the property certainly ought to prove very profitable to its owners.

The Railroad Problem.

The legislation of the last year has not made much progress in solving the problem of the relations of the State and the public to our great railroad corporations. Illinois has moved further in the direction, pointed out by current public opinion, of State regulation of fares and freight charges than any other commonwealth. She has established something approaching to a system of limitations of corporate authority in its dealings with the public. Illinois is in advance of other States in the experiment of State regulation and control of the operations of all corporate wealth. Her example will doubtless find imitators in advance of results, though, as the experiment is somewhat questionable, both in theory and practice, the more conservative communities will prefer to wait and watch before acting. The old limitations in New York of the passenger fares on the New York Central continues, and operates as a check upon the natural rapacity of its present management, as well as upon the charges of other and competing roads. In the matter of freights, however, there is no limitation in that State, save such as is received from competition. This has, so far, proved sufficient for all through business, but the way traffic suffers terribly from overcharges.

In Massachusetts several laws were passed at the late session, in the line of checks upon the greed of railroad management, as well as the ambition for railroad construction. These new statutes, among other things, put conservative regulations upon the increase of railroad capital, protect the rights and comforts of travelers, limit the guarantee of bonds of one corporation by another, and prevent the commencement of new roads on fictitious capital. Thus, no new road is to be built, unless genuine capital to the extent of \$15,000 a mile is subscribed, and no bonds of one road can be guaran-

teed by another, to an amount exceeding the paid-in capital stock of the road aided. Perhaps the most important act of the Legislature on this subject, however, is that which forbids higher charges for freight for a short distance than for a long, upon the same road. This cuts at the root of the great injustice of carrying through freight for less aggregate charges than way, and forbids such anomalies as have often existed, of the carrying of freight to and from the West and Boston and Worcester at less cost than to and from Springfield.

But for the temporary fascination of many minds with the idea of the State's buying and running our leading railroads—to which, unfortunately, the railway commission lent some favor in the discussions of their annual report—the Legislature would probably have gone further and dealt more broadly and effectively with the railroad problem than these special and almost personal acts do. The failure of the proposed general law for the organization, construction and regulation of railroads, is to be attributed as much to the hold which this idea of State ownership had upon the late Legislature as to any other reason. This notion, we are sure, must soon give way to other experiments, much more congenial to our republican system, and, at present, at least, much more hopeful of success. These should be thoroughly tried before the bolder and more radical undertaking is attempted.

On all this subject, however, it is well to make haste slowly. Our railroad system is not yet consolidated. The era of construction, organization and consolidation, which the rapid growth of this country has called into activity, is still upon us. It is not wise to place too severe restrictions upon the system until it has to a degree perfected itself, and shown how far it can wisely regulate itself, as well as illustrated the essential points for State interference. In a broad and practical sense, the country is suffering but little, as yet, from the great railway system—certainly not in comparison with its great benefits. It is now mainly in the hands of its organizers—men of boldness, lacking somewhat in conscience, eager for great and speedy results, and careless of the details of public rights and local claims. These are the natural agents of creation and development; but their work is fast passing, and, in the order of progress, they must be succeeded by men of more conservative qualities and less ambitions. Our railroad properties can hardly fail to pass into the hands of a multitude of owners, whose great interest will be in the maintenance of certain values and the returning of settled profits, whose instincts will be against contests and rivalries, who will shun legislative interference, avoid local discontents, and seek to stifle, by leaving no room for complaint, any call for rival lines. We count, indeed, this as the chief reliance of the public for the satisfactory settlement of the railroad problem. This appeal to the intelligent selfishness and conservative instincts of the capital represented in the corporations, will be likely to ultimately reduce the necessity of State control or of State interference to a narrow province and a rarely serious exercise.

Perhaps the public runs some risk, meantime, in the roads becoming so powerful through aggregation and centralization, and the political ambition of their managers, that they will seek and obtain such a hold upon the fountains of political power as to prevent any possibility of State interference. Unquestionably there is danger of this. There is need of alertness on the part of the popular mind, of jealousy of the encroachments of this particular form of corporate wealth, and of constant warning to the public. But there is equal danger, perhaps, of creating a popular feeling which shall go too far in the direction of limitation and annoyance. The legislation to be sought should be in the line of general principles, equally applicable to all roads, favorable to their development and independence and improvement, and only guarding the public where there is positive danger of encroachment and injury; inspired by no jealousy of a special corporation, seeking no occasion for resentment, but rather aiding every road to develop its broadest capacities to strengthen its power for serving the public, and facilitating its ambition to do the largest amount of work at the least possible cost. Such liberties granted, such encouragements given, will really strengthen the demand that the public shall share correspondingly in the results of these gifts and opportunities and benefits. We gain nothing by worrying the monster, by forbidding his growth and development. Let him grow and be as monstrous as he will, and then let us turn his efforts into the channel of public beneficence; and if his wise selfishness fails to compel him to do his duty in this respect, we may the more justifiably and even powerfully employ the persuasions of the higher law.—*Springfield Republican*.

The Railway Clearing-House.

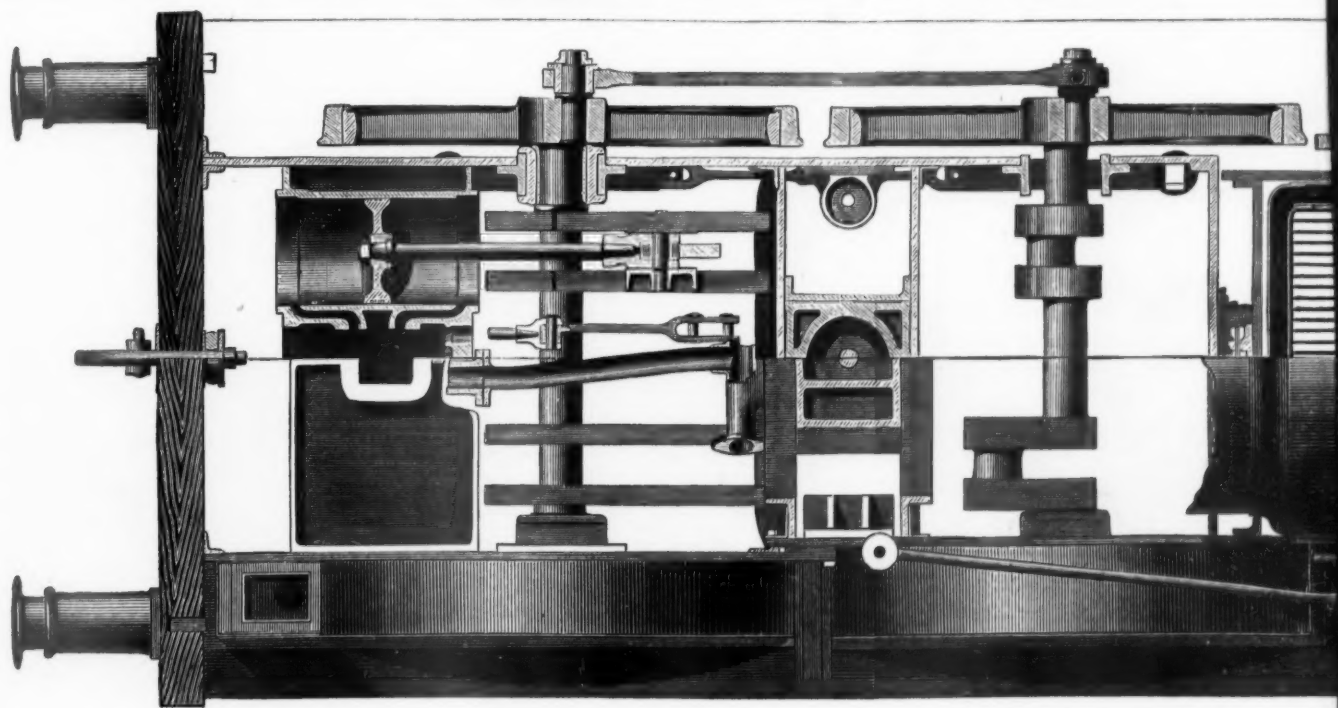
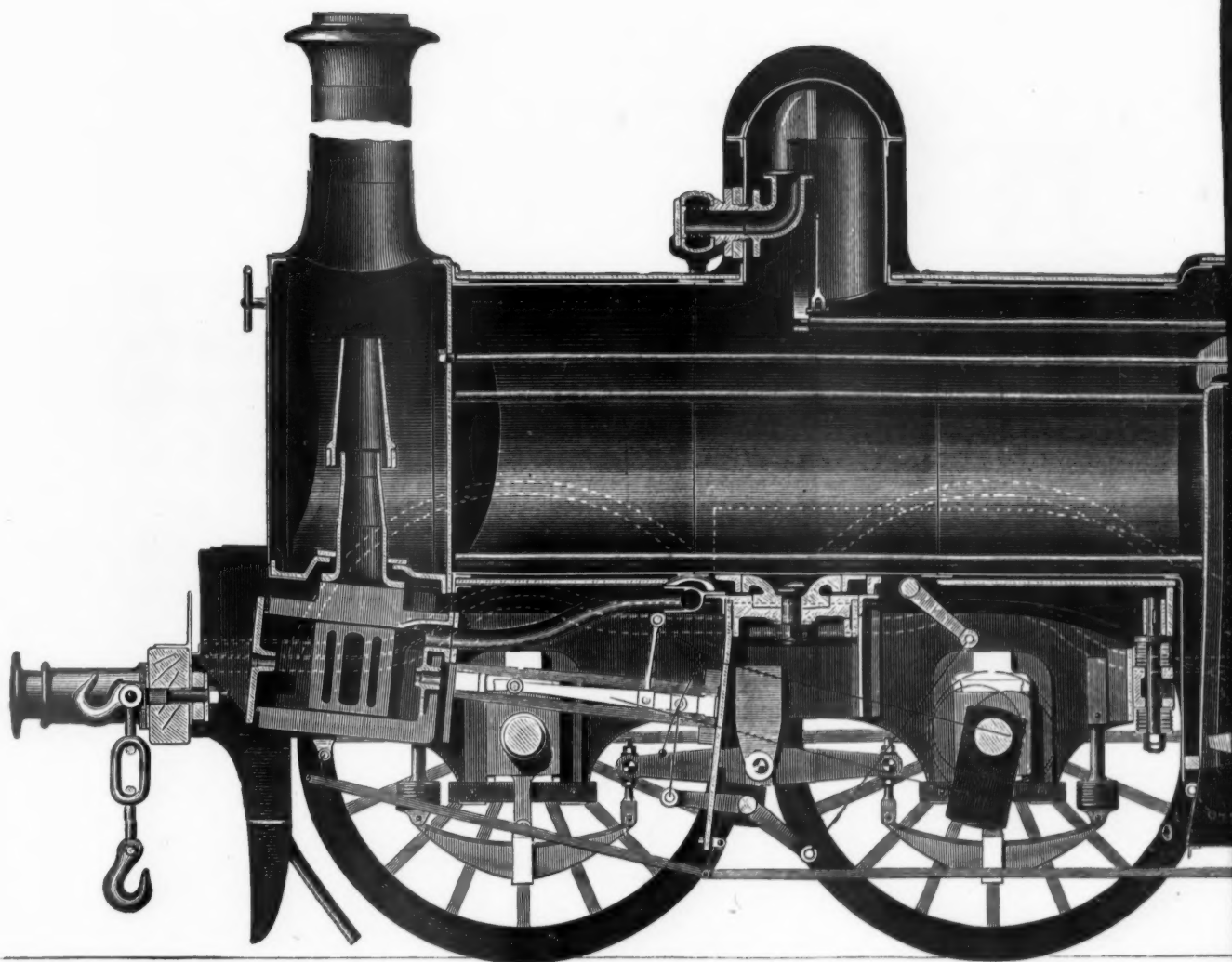
The public, whilst familiar with the enormous working power of the railways of the United Kingdom, and fully appreciating the facilities that exist for uninterrupted transit along continuous lines, is for the most part unaware of the existence of the potent agency by which this through traffic on its present scale is rendered possible. This agency is to be found in the system of "clearing" carried on at the Railway Clearing-House, a large edifice situated in Seymour street, and abutting on the Euston Square Station, having no striking architectural feature to excite attention or inquiry as to its purpose. In this building hundreds of clerks are busily employed in ascertaining the earnings of the railway companies from through traffic, their relative indebtedness at stated periods to each other, and in striking the balances of accounts. The characteristics of through traffic, with which alone the Clearing-House concerns itself, consist, as we need scarcely remark, in the conveyance of passengers and freight, such as goods, minerals, horses and cattle along connected lines of rail, for the most part without change of vehicle and in the provision of one payment in each

case, whatever the number of companies that co-operate in the service, even when steamboat lines intervene en route, as between English, Scotch and Irish ports that are the termini of any lines. Each company associated in the Railway Clearing-House for the auditing of the multitudinous items of account that arise out of the joint service represented in through traffic looks to it for ascertaining at the close of each month the balance due by it to it or owing to it by other companies. As hundreds of millions of computations must be made to ascertain this in the course of a year, the task must appear to common apprehension little less than herculean, but under the able supervision of the manager, Mr. P. W. Dawson, and by virtue of the admirable method employed, the shares in the earnings from through traffic by the co-working companies are determined with unfailing promptness and accuracy. The organization of the Clearing-House, in addition to supervising the financial dealings of the associated companies with each other, gives all the advantages of consolidation of management. The institution, whilst recognized by Parliament as a voluntary association, is granted statutory powers to enforce payment of the balances as between its members, there being no appeal allowed beyond the board, in which each railway company concerned has a representative; at the same time, each is as free to withdraw as to join, but the advantages of a central audit are so apparent that the former course of action would be simply disastrous to the interest of the company withdrawing. The public will not forego facilities it has once acquired, and as with a dammed up stream, to give any check to traffic is only to divert it.

The Railway Clearing-House is, in fact, a huge arithmetical machine operating by aid of the tickets and way bills as vouchers for sums paid, and work done in through traffic, and affording the data of calculation with reference to the tariff charges of the companies concerned. From year to year the work goes on with higher pressure in the increasing amount of new business done, and with the same uniform accuracy, and to the satisfaction of the companies. Any differences that may arise among the members relative to the through traffic, differences as to charges, and not the mode of their adjustment, may be settled amicably at the board meetings at the Clearing-House, which affords a neutral ground for explanations as well as consultations as to any common interest, with the advantages that the details of the past through transactions are ready at hand. In the fulfillment of its functions the Clearing-House performs an incalculable service to the whole country, to which the means of cheap and expeditious transmission are so vital, giving, as it does, to the railways much of the character of one concern, and securing facilities for which the public might otherwise in vain wait. The comparison of opinions by railway officials on this one neutral territory as to the causes operating to promote, retard, or divert traffic, bear their fruit in manifest forms of accommodation, frequently in reduced rates. Without clearing, the cost of conveyance of passengers and goods over two or more continuous lines could not fail to be greater, each company charging without reference to the other. In the early days of railway traveling a company owning only a few miles of rail on a main route—these few miles connecting important lines—would levy contribution out of all proportion to its services. Then as to aggregate fares. At the time when railways had not penetrated northward of Darlington, on the east coast route, or Lancaster on the west, and when such clearing as took place was transacted by the individual companies themselves, the second-class fare from London to Bristol was a guinea. Other causes than the perfected system of clearing in use have contributed to the reduction of fares, such as amalgamation of lines, but it has been a main cause.

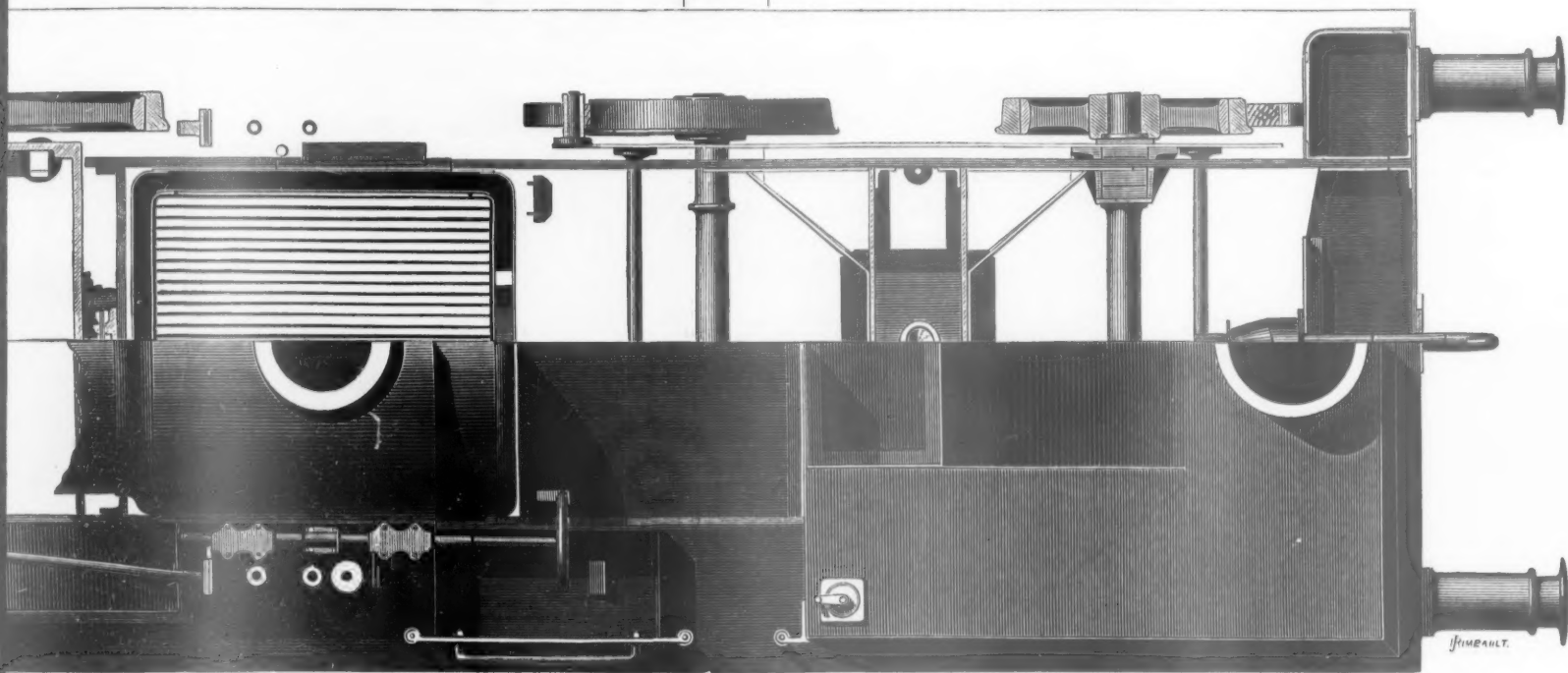
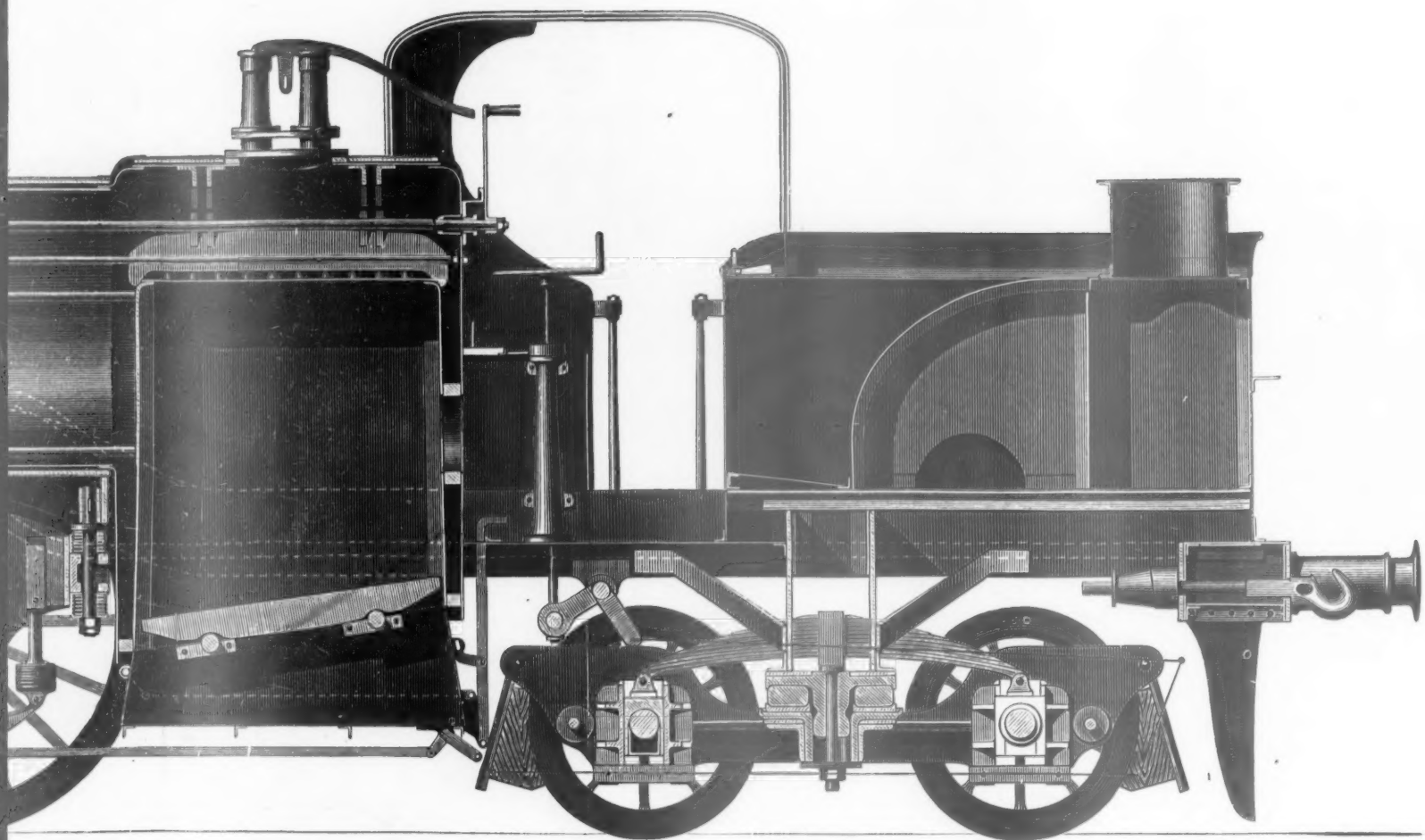
The Clearing-House may be said to have been generated from the necessity of companies to provide for growing traffic. Previously to 1842, when it was established, the companies knew the importance of granting facilities for through traffic, attempted to adjust the accounts for through passengers and freight, and for the running of vehicles on "foreign" lines, that is, lines to which the carriages, vans and trucks did not belong; but the complicated character of the items, the differences in modes of charging, the variability of rates from time to time, and the difference of views entertained as to what should or should not be charged, led to the widest difference in the estimated totals of mutual indebtedness, differences often leading to acrimonious disputes pending the settlement of which through traffic would be seriously interfered with, frequently passengers would have to change carriages and goods; minerals, cattle and horses had to be shifted to new vans and trucks at each junction or station from which they started on other lines, for which new payments would have to be made. Delays from such a cause would now be intolerable, and when existing had the effect of diminishing traffic.

The Railway Clearing-House, in dealing with the evidences of indebtedness, proceeds on the same principle as that which underlies the organization of the Bankers' Clearing-House; as in the Bankers' Clearing-House, cheques, bills, warrants, coupons, etc., received by each banker from his customers for collection, are set off one against the other, instead of being presented in detail at the places where made payable, the associated banks paying only the balance which may appear against them on an aggregate statement, so in the Railway Clearing-House, the several sums received for joint services having been apportioned among the earning companies according to pre-arranged terms, the aggregate items of indebtedness of one company against another are set off against that of the latter, and the balance to be paid over determined, the payment of this balance discharging all claims. The credit of the inception of this mode of settlement for railway companies, as well as for many of the working details in their clearing system, is due to Mr. George Carr Glyn, now Lord Wolverton, who brought to bear on it his



SINGLE BOILER FA

Designed and Constructed by Mr. A. McDonnell, Engineer of the



BOILER FAIRLIE LOCOMOTIVE,
 , Engineer of the Great Southern & Western Railway of Ireland, Inchcore, Dublin.

knowledge of railway affairs as well as banking, and who applied his great influence to induce the railway companies to associate. This, at the outset, was by no means easy. Some of the companies were afraid of thus merging to some extent their individuality, of foregoing control over their own affairs; but experience has shown the groundlessness of this apprehension, as well as of the alarm expressed in Parliament, and which found an echo in a portion of the press, that the Clearing-House would be the nucleus of a gigantic monopoly, working adversely to the interests of the public. It but simplifies matters of account, economizes time and labor. Each London bank that acts as agent to one of the associated companies pays monthly to the Clearing-House, or receives a balance, as the case may be, in settlement of its current account with each company with which it does joint work in "through" traffic. The sum of these monthly balances, however, holds no more relation to the aggregate value of joint operations of this character than the sum required to cancel the exchanges at the City Clearing-House to the amount paid in.

In the Railway Clearing-House the exchange of claims with reference to striking a balance is provided for by the companies sending up to it the tickets and abstracts of way-bills received, together with statements of those delivered that pertain to "through" traffic. The process of classification and examination of tickets, which, of course, represent passenger traffic, is aided by their distinctive colors, forms and numbers, the latter being printed consecutively, and affording, on comparison with the corresponding statements, the means of identification. Then the proportion in which the different companies concerned in each ticket must be determined, and the separate sums into which it is to be divided, credited. In this allotment, the class of ticket, the points of departure and arrival, the tariff of charges of two or more companies, must be taken into account, and the result forwarded to the several companies for verification. In the merchandise department the return in the abstract of way-bills forwarded includes the date and number of each invoice, with amount charged and received, the weight, route, and the number of wagons receiving the goods. The carriage of goods, etc., is complicated by diversity of payment, sometimes being paid beforehand, sometimes in part, sometimes not until delivery, and frequently being encumbered with terminal charges. In determining mutual indebtedness, the clearing system takes into account mileage and demurrage charges, the former being the charge made by a company for the wear and tear of its vehicles while running on "foreign" lines, the whole amount being determined by the miles run, and the latter the charge of a company for the detention of its vehicles on a "foreign" line after they have performed their allotted journey. Before the establishment of the Railway Clearing-House wholesale appropriations thus took place. To secure due supervision in respect to the travel of vehicles on foreign lines, upwards of 300 clerks are employed at various stations and junctions to note them as they arrive and depart. The jurisdiction of the authorities of the Railway Clearing-House extends over 13,000 miles of railway. The institution has grown with the growth of our railways, the system extending from its center in London to the utmost limit of our railway communication.—*Herald's Railway Journal.*

Toledo, Wabash & Western Railway Report.

The Toledo, Wabash & Western Railway extends from Toledo, Ohio, generally west by south to Camp Point, Ill., 455 miles. It has a branch from Decatur, Ill., southwest to East St. Louis, 109 miles; one from Bluffs City, Ill., (52 miles west of Springfield) west to the Illinois River at Naples, 4 miles, and one from Clayton, Ill., (6 miles east of Camp Point) northwest to Hamilton, opposite Keokuk, 41 miles; and it has the use of and runs trains over the Chicago, Burlington & Quincy Railroad from Camp Point to Quincy, 22 miles. It has control, also, of the Hamilton & Naples Railroad, which is a continuation of its line from Naples due west to the Mississippi River, and by which, together with the new Hannibal Bridge, and the Hannibal & Central Missouri Railroad (soon to be completed under its auspices from Hannibal to Moberly), and the North Missouri Railroad, it will soon have a direct line from Toledo to Kansas City. This Hannibal & Naples road is 46 miles long, with a branch from Maysville to Pittsfield, 6 miles. The Hannibal & Central Missouri Railroad will be 70 miles long. The accounts of these roads are kept separately, and the report of the company covers the 609 miles owned and the 631 miles operated directly by it.

The annual report for the year ending December 30, 1870, shows the following earnings and operating expenses compared with 1869:

EARNINGS.		1869.	1870.
From passengers.....		\$1,974,539	\$1,212,801
" freight.....		2,681,235	3,009,025
" mail.....		73,049	81,993
" express.....		79,105	75,595
" miscellaneous.....		145,411	192,138
Total.....		\$4,322,342	\$4,544,640
EXPENDITURES, viz:		1869.	1870.
Iron and superstructure.....		\$538,617	\$450,303
Roadway and structure.....		513,666	663,372
Cars, engines, etc.....		49,733	468,278
General expenses.....		1,549,386	1,654,510
Total.....		\$3,551,402	\$3,336,364
Net revenue.....		1,300,938	1,308,376

Compared with the previous year, the gross earnings of 1870, show an increase of \$322,398; increased expenditures, \$184,850; and net increase, \$107,438.

The receipts from all sources and the expenditures on all accounts in 1870 were as follows:

RECEIPTS.	
Gross revenue for 1870.....	\$4,544,640
Proceeds of stock.....	914,331
Cash from 1869.....	5,230
I. H. Knox & Co.....	91,484
Connecting roads and individuals.....	83,103
Total.....	\$5,638,840
EXPENDITURES.	
Operating expenses for 1870.....	\$3,336,364
Equipment.....	635,850
Construction.....	367,946
Miscellaneous (\$1,315,178.44) viz:	
Interest less unpaid coupons.....	1,900,139
Meredonia Bridge in New York.....	625
Coupons, Hannibal & Naples Railroad.....	24,534
Coupons of previous years.....	25,012
Profit and loss.....	65,966
Assets of current year.....	\$356,011
Less bills payable, \$56,690, and less overdraft, \$306,740.....	263,431
Total.....	\$5,638,840

The equipment of the line has been largely augmented during the year, by the addition of 636 first-class cars of various kinds, and other business facilities, which will contribute to the removal of a want that has hitherto seriously affected the business of the road. The general renewals of the rolling stock and machinery have been prosecuted systematically and thoroughly, so that they are now in a superior condition of efficiency.

The improvements made upon the track and superstructure have been unusually extensive; over 81 miles of new iron have been laid with fish-joint, and about 70 miles of old rails have been mended and replaced. The general roadway has been much improved by more thorough ditching, and the removal of perishable structures and the substitution of permanent ones.

During the year, the Decatur & East St. Louis Railroad Company was merged into the Toledo, Wabash & Western Company, by an act of consolidation; owing, however, to the lateness of the completion of the road and the incomplete warehouse and station accommodations, its value as an auxiliary has been but partially disclosed.

With a view to further strengthen their position, the company have effected favorable arrangements for the control of the road now in process of construction between Decatur, Lincoln and Pekin. It is expected that this line will be opened for business early in the autumn of 1871.

The early completion of the new railroad from Lafayette to Bloomington is looked forward to with interest. It has lately been leased to this company, and its eastern terminus changed to Attica, on its main line. This line, like the last one referred to, passes through the most productive counties of Illinois and Indiana, and will secure to the Toledo, Wabash & Western Railway a large traffic in grain, etc., which will naturally seek an outlet east by way of Toledo.

The equipment of the company at the close of 1870 consisted of 130 locomotives and the following cars: passenger, 54; sleeping, 3; directors', 1; smoking, 4; mail and baggage, 33; box freight, 1,695; stock, 391; platform, 280; coal, 406; caboose, 52, and others, 58—total, 3,111. Engine houses, 13; stations, 120.

New iron put in track 81.2 miles; iron repaired and replaced, 76.5 miles; new ties put in track 310,200; new passenger buildings, 2.

INCOME ACCOUNT.	
Balance of net income.....	\$1,308,376
Income account of 1869.....	540,906
Capital stock.....	3,106,563
Total resources.....	\$5,016,187
Construction and equipment.....	994,400
Interest account.....	1,238,159
Discount on capital stock.....	2,358,573
Profit and loss.....	65,966
Balance carried to next year.....	478,187
Total.....	\$5,016,187

The company commence the year 1871 with materials, fuel and other available assets to the amount of \$691,849.23, in which are included material and fuel, \$292,835.52; cash, \$173,231.97, etc.

The general balance sheet gives the following:

Capital stock—general, \$15,000,000; 7 per cent. preferred, \$1,000,000; funded debt (mortgages of thirteen kinds) \$18,387,000; bills payable, \$56,696.60; coupons due, \$25,019; income balance, \$858,744.59.

Per contra: Road and equipment, \$33,590,000; first mortgage bonds (Griswold and other trustees), \$797,000; materials and fuel, \$292,835.52; Post-Office Department, \$3,393.75; investment account, \$654,254.54; equipment account, \$84,574.08; sinking fund consols, \$75,000; balances due from railroads and individuals, \$7,387.67; cash on deposit in New York, \$173,231.97; total, \$35,327,454.34.

The directors of this company (chosen October 5, 1870,) are Azariah Boody, A. M. White, Isaac Knox, William Kidd, A. B. Baylis, Augustus Schell, Horace F. Clark, J. H. Banker and S. B. Chittenden, New York; Warren Colburn and J. N. Drummond, Toledo; Amasa Stone, Jr., Cleveland; George Cecil, Logansport, Ind.; James Spears, Lafayette, Ind.; C. M. Smith, Springfield, Ill.

—Elsewhere mention is made of the commencement of the trial for manslaughter, at Joliet, Ill., of a Mr. Peaselee, an engineer of the Chicago, Rock Island & Pacific Railroad, for running over and killing, with his engine, a man named Wigent. The trial was closed on the 20th. After a lengthy argument the jury retired, but quickly returned, having agreed upon a verdict of not guilty by the first ballot. The jury then presented to Mrs. Peaselee, who has been attending upon the trial throughout, a written statement to the effect that they fully exonerated Peaselee from all blame in regard to the death of Wigent.

German Locomotives.

The following is a letter written from Berlin to *Engineering*, by Mr. A. Brunner, Superintendent of the famous Cockerell Works at Seraing, Belgium. Mr. Brunner's interesting letter on American locomotives was published in Vol. II., page 534 of the RAILROAD GAZETTE:

You kindly inserted, a short time ago, a letter from me on American locomotives, dwelling notably on the differences between European and American practice. Although the present topic may not anticipate—nor can it possibly comprise—an equally marked distinction, there are nevertheless many points in it which will justify a few general remarks and observations on "German Locomotives" as distinct from British-built engines.

In general proportions and dimensions the German engines may differ very little from those in use on English railways; the standard German passenger engine having usually four-coupled driving-wheels and an independent pair of leading wheels, while the goods engines have invariably all the six wheels coupled and a six-wheeled tender. In Germany, however, all the wheels are usually placed under the boiler-barrel, reducing thus the total wheel-base, but injuring, on the other hand, the stability of the engine. What is known as the "Crampton engine" with one pair of very large driving-wheels behind the fire-box, is now only seldom met with in Germany, for although these engines run with remarkable steadiness at high speeds, they proved wholly inadequate to the always increasing traffic, requiring, in a proportionate degree, an increased traction power, and consequently coupled driving-wheels. Of late, four-wheeled locomotives with a four-wheeled tender have also been introduced to a certain extent, and where employed for moderate runs they have generally given great satisfaction. These engines weigh from 22 to 24 tons (all adhesive weight), and they are, in this respect, fully as powerful as the heavier six-wheeled passenger engines, weighing nearly ten tons more. For shunting purposes, small tank engines on four wheels are preferred; these engines are made by some German makers of a very neat pattern (as may be seen at the Hanover Station) and they certainly admit of a better control of engine and train, during the operation of shunting, than the ordinary engines.

Respecting the construction of German locomotives, the form of the boiler requires special notice. There are to be found two peculiar shaped fire-boxes, namely, the high dome box, illustrated on page 337 of the seventh volume of *Engineering*, and the flat-topped box, known as Belpaire's. For each of these forms special advantages are claimed, and both forms give additional steam room; the latter plan, however, is coming into more general use. In some cases, as in engines of the Hanoverian Railway, the hind portion of the fire-box is made inclined, maintaining the requisite length at the grate but sloping forward from bottom to top. The saving in overhanging weight (the wheels being all under the boiler-barrel) effected by this arrangement has proved, however, to be but little; moreover, the hind plate of the fire-box suffered to such an extent by the action of the fire that the plan had to be abandoned. Evidently for the same purpose, namely, to economize weight, some German engineers have thought to suppress the fire-box roof-stays by shaping the fire-box crown to a semi-circle, stayed to the likewise semi-circular top of the fire-box casing by a sufficient number of stay-bolts. At the same time, the water level has been raised somewhat, and the distance from top of fire-box to center line of boiler increased correspondingly, in order to compensate partly for the loss of tube service, arising from the semi-circle form of the tube-plate. Steel plates are largely employed, but their use does not seem to be attended by a corresponding reduction in the thickness of the plate; in fact, the steel plates for the barrel are made from 7-16 inch to 3/8 inch thick, contrasting strongly with American practice, where 1/2 inch to 5-16 inch steel plates are found sufficient. It should be stated, however, that, in this respect, the German makers are subjected to the government regulations. Both the longitudinal seams and the transverse seams—which are mostly arranged on the lap-joint plan—are usually double riveted, the rivet holes being always drilled, and not punched, and the riveting done by hand. Before being drilled, the plates are bent to their correct shape and temporarily put together. The boiler barrel is then mounted on two trucks, which can be rolled along a line of rails placed under the drill, these trucks carrying in their turn rollers fixed transversely upon which the barrel can be turned round its longitudinal axis for the purpose of drilling the rivet holes for the transverse seams. A still better plan would be, perhaps, to drill all the rivet holes from a slide-rest drill, which could be moved horizontally along the boiler-barrel.

Outside frames, with Hall's crank-journals, are frequently employed. In this case the boiler is secured to the framing often at both ends; at the smoke-box tube-plate by means of strong angle irons; at the fire-box end it is connected, on each side, to the frame plates by a 3/8-inch plate placed vertically, these plates bending slightly as the boiler expands. The boiler rests on the bracket-plates by means of intermediate brass rubbing-pieces, secured in their places by countersunk screws, passing through the angle irons of the boiler-brackets. This plan might be employed with advantage to a greater extent, as it affords a good support to the boiler, and can be fitted with much facility. The frame-plates are often made of two plates riveted together, but solid frames, from 1 to 1 1/2 inches thick, are coming into more general use. It should be observed that the outline of the framing does not present those strong forms which are now made in English practice; to begin with, the depth of the plates themselves is less, and the junctions of the horn-plates with the main body are invariably too sharp. In some cases, also, the frame-plates are much weakened—in fact, the

plates nearly cut asunder—by large holes, made to gain access to the stay-bolts, which were drilled for the purpose of detecting failure.

Many of the German builders do not make their own wheels, but receive them from the large establishments at Essen and at Seraing, in Belgium. At Seraing an excellent wheel is now made in the following manner: The rim of the wheel is formed in one solid circle, the wheel boss is molded under the steam hammer from a solid block and provided with a recess; into this recess, and into a corresponding number of notches, slotted previously into the rim, the spokes are fitted and afterwards welded up. The wheels are generally very carefully finished at the factory, and invariably slotted inside the spokes; it is, indeed, nothing unusual to plane the spokes longitudinally also over both edges. The wheels are sometimes put on the axles without any keys, but merely by a sufficient hydraulic pressure, while the crank-pins are additionally secured by strong set-screws.

Respecting the working gear of German engines, it should be said that formerly these parts, particularly the crank-pin journals, were manifestly deficient of ample bearing surfaces; but of late years this has been corrected, and all the details are now generally worked out and finished in a first-rate style. Under the headings of boiler fittings, reversing gear, breaks, etc.—which could not well be described without drawings—many ingenious attempts have been made towards rendering these various organs as efficient as possible, some peculiarities of which you have already noticed in your very able description of a goods locomotive for the Hanoverian Railway, *vide* vol. viii., page 253.

Berlin, the young empire city, can boast of three locomotive building establishments, all located in close proximity, in the Chaussee, and capable of sending out collectively about 400 locomotives per annum, an amount of local production which probably finds its parallel only at Manchester, in England, and at Paterson, in New Jersey, U. S. It will be remembered that M. A. Borsig's two thousandth engine was exhibited at Paris in 1867; since then above 700 new engines have been completed at M. Borsig's works. One of the largest locomotive establishments, if not the very largest on the Continent, exists at Hanover, where a sufficient plant for the making of 300 engines yearly has been set up. These works were acquired by the enterprising Dr. Strousberg from M. Egestorff, but after having been enlarged to their present extent they were recently sold again to a joint-stock company. Adding now to the large workshops already enumerated, the numerous establishments at Stettin, Chemnitz, Cassel, Esslingen, Munich, and Karlsruhe, the annual productive power of the now united German Fatherland will reach the great figure of about 1,500 locomotives.

Railroads and Investors.

Judge Blatchford's decision on Wednesday in the Erie case seems to have evoked approving comment from all parties. The foreign owners of the 60,000 shares in dispute are gratified that the whole of their stock is ordered to be placed in a negotiable form in the hands of the receiver of the court; and their opponents are content to be allowed to register the 30,000 new shares, notice of the issue of which has recently been given to the Stock Exchange from the Farmers' Loan and Trust Company, by whom the transfer books of the Erie Company are kept. When the history of the complicated litigation of this corporation comes to be written it is boldly declared that many of the deeper causes of the scandals of the past four years will prove to have been overlooked, and that various parties are implicated who have so far succeeded in escaping public opprobrium, though they have forced on others the responsibility and the odium of grave irregularities. How much truth there may be in these suggestions, we must leave it to the future to decide. One thing is certain. Almost the only excuse popularly made for the present managers of the Erie road is that they have prevented that great corporation from falling into the hands of the powerful monopoly which has already got control of the other direct avenues of commerce between this city and the great West. Of course this plea does not excuse a want of integrity on the part of anybody, and it is never permissible to do evil that good may come. Besides, there were abundant means to prevent by more legitimate action the absorbing of the Erie corporation by the Vanderbilt clique. Such, however, is the general opposition to monopolies, and so strong the antagonism to their extension that much of that popular acquiescence in the doings of the Erie managers which has so puzzled foreigners is thus explained, and especially as those managers are said to have improved the accommodations of their road, and to have greatly added to the facilities of freight and passenger travel.

This same violent opposition of the popular mind to clique ownership of railroads is exhibiting itself every day in various forms in Wall street. To it is due the fact that so few roads are regarded as offering safe investments in their stock. Three or four years ago there was an increasing number of our leading railroads in the East and West, the shares of which were very largely held by investors. But scrip dividends, cornering operations, and various other manoeuvres of speculative capitalists have checked this movement. The public prefer good railroad bonds to doubtful railroad shares, and now, as an inevitable result, our railroads have passed almost wholly into the control of powerful combinations of capitalists, who are moved by considerations of private interest rather than public advantage, and who regard their several roads as a speculative property, to be manipulated at the Stock Exchange rather than as a grave public trust, confided to them by their fellow-citizens for the promotion of great national objects. We are in a transition period of railroad development. The evils we refer to will bring their own cure. What is wanted is more rigid

responsibility on the part of directors and managers of railroad property. These men must be made amenable to an enlightened public opinion. If they betray their trust, punishment must be provided. At an earlier period this was not needed. Before the war railroad building too often discouraged and impoverished its votaries. And the absolute need of communication was so imperative that the construction of railroads was thrown freely open to the public. The vast growth of commerce, and wealth, and population during the last ten years has destroyed the safeguard of competition by making it the interest of shrewd capitalists to manipulate the traffic and the revenues of certain roads with a view to raise the speculative value of the shares at the Stock Exchange. The relations of these roads to the local traffic, and the reciprocal dependence of railroads for prosperity on the growth of the districts they traversed, was liable at any time to be recklessly sacrificed to some through traffic arrangement, or some Wall street speculative operation. Hence have arisen colossal associations to consolidate various companies, and these have grown till a dozen large corporations threaten to control the whole internal commerce of this country. Will these threats be fulfilled? Of course they cannot be carried out in opposition to the will of the people. For these corporations are the creatures of legislation. Almost every other nation besides the United States has asserted more or less explicitly the paramount rights of the government over its railroads. On the Continent of Europe many of the roads will in course of years lapse into the ownership of the government, and pay a revenue to the National Treasury. Of course we do not recommend that such a policy of government ownership should be adopted here. It is not quite in accordance with certain fundamental principles of government, and is otherwise inadmissible. But its discussion may serve to show that the concessions entrusted to railroad companies for the public good, confer on the managers of these roads no power to fill their own pockets by robbing the people, and that the rights of boards of directors are shut in by very narrow bounds and sharply defined limits.

The answer to the demand for a remedy is therefore not far to seek. There are numerous indications that we are approaching a new state of things, and that the evil is working out its own cure. First, investors are losing confidence in clique railroads. The public is withdrawing capital from railroad shares and putting it into good railroad bonds instead. If the fuel fails the fire will soon die out. Speculation cannot live without the capital of outside investors. It is notorious that the schemes of the cliques have for two years and more brought disaster oftener than profit. Under these circumstances they cannot long hang together and their dispersion is a mere question of time. Another lively opponent of these clique movements is the projection of new competing lines of road. As one of the numerous illustrations of this we may mention the proposed short railroad to Chicago. It is suggested by the opponents of the Vanderbilt monopoly. It proposes to shorten the time between Chicago and New York to twenty hours, to tap the largest anthracite coal region of Pennsylvania, to place Pittsburgh 36 miles nearer to New York; Cleveland, 120 miles; St. Louis, 77 miles; and Chicago, 96 miles. It promises to take grain from Chicago to tide water at four-fifths the present cost, and to be ready for operation by 1875. Such propositions are both a consequence and a remedy of the evil we are discussing. Without the vast combination of capitalists to which the railroad public have been familiarized in the past few years such large enterprises could not be attempted; and in presence of such enterprises ever waiting to be realized mischievous monopolies cannot long fester the movements or oppose the beneficent mission of railroad progress.—*Commercial and Financial Chronicle*, July 15.

What is a Railroad Connection?

The following are the grounds on which the Supreme Court of Maine, in the injunction case between the Boston & Maine, and the Portland, Saco & Portsmouth railroad companies, sustained the injunction until a final hearing and decision of the case: In the charter of the Portland, Saco & Portsmouth Company the Legislature reserved the right to authorize other roads to connect with its road; and afterwards authorized the Boston & Maine Railroad to connect with it. The case turned upon the meaning of the term connect, and the court held unanimously that it means not only a physical connection but a business connection, so as practically to make one road of the two thus connecting. Question was also made whether the court has jurisdiction, the statute having authorized the railroad commissioners to fix times and terms in such cases. But the court held that it has jurisdiction in this case, because the respondents claimed that the statute requiring them to draw the cars of a connecting road was unconstitutional in respect to them, and denied the right of the Boston & Maine Company to have their cars thus drawn, and because the remedy through the railroad commissioners would be so slow as to be entirely inadequate, and in the meantime the rights of the public as well as of the other complainants would be most injuriously affected.

—An important railroad case was decided on the 20th inst., in the Circuit Court at Fort Wayne, Ind., by Judge Lowrey. The Fort Wayne, Jackson & Saginaw Railroad Company brought suit against Pfiffer & Co. for the payment of subscription in aid of its road, and the case was on trial for several days. In his decision the court claimed that the Legislature cannot authorize corporations to exercise corporate powers outside the limits of the State, and that, therefore, the election attended in Jackson, Michigan, by Indiana stockholders, was without authority, and hence, void. An appeal was at once taken to the Supreme Court.

General Railroad News.

PERSONAL.

—A contemporary under the head of "The Man with Nothing to Do," gives the following account of some of the duties of a noted railroad man:

"Some of the friends of T. A. Scott are a little solicitous lest he should be out of a situation this summer, and are engaged hunting up railroads two or three hundred miles long, to enable him to take the Presidency, just to keep his hand in. This is well enough, as he is only President of five roads, including the Union Pacific, Vice-President of twelve, including the Pennsylvania Central, director of thirty-three, and General Consolidator of the balance. He keeps four secretaries busy looking after his iron, oil, silver, gold, quicksilver, lead, slate, steel, coal and wild land interests; devotes a few leisure moments to steel rail and locomotive manufacturing, steamship lines, bridge building and engineering; finds relaxation in running the Pennsylvania and Virginia legislatures, and finds entire repose in directing Congress, the President and the Supreme bench in all that relates to his claim of road throughout the land. Independent of all that, he is married. His locks are slightly sprinkled with gray, but this comes of years, not care. His face wears a sunny smile, and is as cheerful as a robin in May. It is well that his friends look after him, and time is not permitted to hang heavy on his hands."

—Mr. Charles E. Byers, Chief Engineer of the Philadelphia & Reading Railroad, and for twelve years in the employ of that company, died in Pottstown, Pa., on the 10th inst., in the 39th year of his age.

—The Buffalo *Commercial Advertiser*, noticing the appointment of Mr. James Charlton as General Ticket Agent of the Chicago & Alton Railroad says: "He has made a fine reputation in the railway world, and, what is better, he fully deserves it. His twenty-three years of railway service (nine with one company in England, thirteen with the Great Western, and one with the North Missouri), have been well improved, and now he has no superior in his branch of the business."

—Mr. F. E. Morse, the well-known General Western Passenger Agent of the Lake Shore & Michigan Southern Railway, was surprised last Wednesday morning by the presentation of a beautiful and elegant gold watch chain, valued at \$50, the gift of his railroad friends and associates. It was certainly a most beautiful gift and most worthily bestowed.

ELECTIONS AND APPOINTMENTS.

—Isaac D. Jones, Baltimore; P. Toadvine and William S. Parsons, Salisbury, Md.; H. H. Dashiell, William H. Gale and S. S. Costin, Princess Anne, Md.; George R. Dennis, Kingston, Md.; Thomas Ludler, Wistover, Md.; Samuel Harlan, Wilmington, Del., and William H. Roach, Hopewell, Md., have been re-elected directors of the Eastern Shore Railroad Company of Maryland. George R. Dennis was chosen President in place of John W. Crisfield.

—John King, Jr., has been elected President, and John Hopkins, Thomas Whitridge and Hugh Sisson, of Baltimore; Joseph H. Sherrard, of Winchester, and George A. Hupp, Strasburg, directors of the Winchester & Strasburg Railroad Company.

—At the annual stockholders' meeting of the Lafayette, Muncie & Bloomington Railroad Company, held at Lafayette, Ind., on the 6th of July, the following directors were re-elected: John W. Burson and J. S. Buckles, Muncie; John Green, Tipton; A. B. Givin, Frankfort; Adams Earl, Moses Fowler, M. L. Pierce, H. T. Sample, H. W. Chase, O. Ball, John Opp, W. S. Lingle, Lafayette; W. J. Templeton, Oxford. At a meeting of the directors Adams Earl was elected President; E. M. Talbot, Secretary and Chief Engineer; Thomas Coleman, Treasurer.

—A. G. Warfield, Jr., late Assistant Engineer of the Pittsburgh & Connellsville Railroad, has been appointed Engineer of the Japanese Commission, and will sail from San Francisco about the 1st of August for Japan.

—The annual meeting of the Franklin Telegraph Company was held in Boston on the 7th inst., at which the following directors were chosen for the ensuing year: Messrs. James W. Brown, Sidney Dillon, Oliver Ames, Edwin F. Waters, Joseph B. Stearns, Weston Lewis, James H. Freeman, Joseph J. Durham, Samuel L. French. Mr. James W. Brown was elected President, and Joseph J. Durham, Secretary and Treasurer.

—A. Newman, late General Passenger Agent of the Chicago & Alton Railroad, has been appointed Assistant General Freight Agent of the same road.

—R. R. Cable, the new President of the Rockford, Rock Island & St. Louis Railroad Company, will act as General Superintendent of the road in place of E. Sweet, resigned. H. Loosley, formerly Superintendent of the Southern Division, has been appointed Assistant Superintendent, in place of J. R. Jones, resigned.

—The following have been chosen directors of the Hamilton & Lake Erie (Canada) Railway Company: James Turner, President; Edward Gurney, Vice-President; John Stuart, W. J. Copp, John Young and Thomas C. Kerr.

—At the recent annual meeting of the Chicago & Southwestern Railway Company at Leavenworth, the following directors were elected for the ensuing year: F. H. Winston, John F. Tracy, Geo. C. Campbell, Hugh Riddle, H. H. Porter, Chicago; Ebenezer Cook, Davenport; David Dows, F. H. Tows, New York; William L. Scott, M. Courtwright, Erie; James N. Burnes, H. M. Ailer, Weston; James F. Wilson, Fairfield. Of these Messrs. Winston, Tracy, Cook, Campbell, Dows, Scott,

Aller and Burnes were members of the last board. The others succeed A. L. Perrin, of Camden Point, Mo.; Bonifant and C. A. Perry, of Weston, Mo.; and N. Edgerton, of Leavenworth. Of the present board seven are members of the Rock Island directors, two others (Messrs. Riddle and Campbell) are officers of that company, and three others are influential citizens residing on the line of the road.

—Mr. E. H. Waldron, late Assistant Superintendent of the Louisville, New Albany & Chicago Railway, resigned that office on the 19th inst. to accept the Superintendency of the Cincinnati, Lafayette & Chicago line.

—At Sturgis, Michigan, on the 19th inst., the stockholders of the Grand Rapids & Indiana Railroad Company elected the following Board of Directors, the number being increased from nine to thirteen, what it has been: J. N. McCullough, Springer Harbaugh, Pittsburgh; Pliny Hoagland, F. P. Randall, S. K. Edgerton, M. Talcott, Thos. D. Messler, J. G. Waite, B. M. Hanks, G. H. White, H. J. Hollister, Wm. Howard, and Andrew Ellison. J. N. McCullough, Springer Harbaugh, Thomas D. Messler, Pittsburgh, Pa.; Joseph K. Edgerton, Pliny Hoagland, Fort Wayne, Ind.; George H. White and William A. Howard, Grand Rapids, Mich.; Andrew Ellison, La Grange, Ind.; Jonathan G. Waite, Sturgis, Mich.; Mancel Talbott, Chicago; B. M. Hanks, H. J. Hollister and F. B. Randall. All the old members were re-elected. The new members are Messrs. Howard, Hanks, Hollister and Randall.

MISCELLANEOUS.

—The iron steamer China, belonging to the Atlantic & Duluth & Pacific Lake line of steamers, was launched at Buffalo on the 19th inst. This is the sixth iron steamer built in Buffalo this spring.

—The American Merchant's Union Express Company has declared a dividend of \$3 per share, payable July 1.

—The telegraph says: "The question having arisen last fall whether tax should be collected at the rate of 2½ per cent. on dividends declared by railroads and other corporations for the last five months of 1870, Acting Commissioner Douglass decided that, under the law, it should, and orders were given to assessors accordingly. After General Pleasanton succeeded to office, he reversed the decision, but the matter having been brought to the attention of Secretary Boutwell, he referred it to the Attorney-General, who set aside the last decision, and ordered the commissioners to assess and collect the tax. These instructions were immediately communicated to the local revenue officers; but numerous applications and appeals have recently been made by railroad companies and bankers that the tax be remitted or suspended, on account of the severity of enforcing its collection at this time. Commissioner Pleasanton, in view of Secretary Boutwell's instructions, does not think proper to allow any delay. It is ascertained, however, that an exception has been made to this ruling in the case of the New York Central & Hudson River Railroad, an order from the Secretary of the Treasury or the President having been filed in the Internal Revenue Office, suspending the collection of this tax against these roads."

—According to a late telegram from Washington, dated the 20th, the Solicitor of the Treasury is expected to deliver to Secretary Boutwell his opinion on a very important question now pending before the Treasury Department. It will be remembered that the order of Commissioner Pleasanton instructing Assessors and Collectors of Internal Revenue not to assess or collect the tax on dividends for the last five months of 1870 was revoked on the 16th of May. Under the ruling of the Attorney-General, Collectors and Assessors were directed to govern themselves accordingly in assessing and collecting the tax embraced within the scope of the decision. When this order was announced, protests against its enforcement were sent to the Secretary of the Treasury from all the leading railroad corporations and banking institutions throughout the country. It was represented that the dividends and interest on coupons had already been paid, without deducting government tax. That it was done in obedience to the order of General Pleasanton, and that now they have no way of securing themselves in case the government exacts the tax, while the act for which they must be held liable is that of the government official, whose authority they have no right to question. The case presented to the Solicitor is a novel one, and upon his decision rests the suspension or collection of the tax. While the Attorney-General has construed the act of July 14, 1870, so as to make the railroads and insurance companies liable to a tax for the last five months of 1870, yet it is a question which may eventually have to be settled in the courts, whether the government is not bound by the acts of its officials, and the collection of the tax be declared illegal.

TRAFFIC AND EARNINGS.

—The receipts of the Grand Trunk Railway for the week ending June 24, 1871, were \$33,800, against \$30,100 in the corresponding week of last year, showing an increase of \$3,700, or more than 12 per cent. The increase of earnings for the first half year of 1871 is nearly \$70,000.

—The traffic receipts of the Great Western of Canada, for the week ending June 30 amounted to \$18,709, against \$15,141 in the corresponding week of last year, showing an increase of \$3,568, or 23½ per cent.

—The traffic receipts of the Grand Trunk of Canada, for the week ending June 17, amount-d to \$30,800, against \$29,400 in the corresponding week of last year, showing an increase of \$1,400, nearly 5 per cent.

—The traffic receipts of the Great Western of Canada for the week ending June 16 amounted to \$16,889,

against \$15,453 in the corresponding week of last year, showing an increase of \$1,437, or 9½ per cent.

—The Buffalo Commercial Advertiser gives the following tabular statement of the average rates of freight on wheat and corn, by lake, from Chicago to Buffalo, and by canal from Buffalo to New York, for the month of June during the past eleven years:

	LAKE.		CANAL.	
	Wheat.	Corn.	Wheat.	Corn.
1861	6 5	6 8	11 8	10 8
1862	8 5	7 6	12 8	10 8
1863	10 0	9 0	14 3	12 3
1864	13 4	12 8	18 1	16 2
1865	6 6	6 0	18 6	11 6
1866	15 6	13 6	16 6	14 3
1867	5 5	5 7	18 2	11 2
1868	5 3	4 3	18 6	11 9
1869	6 6	6 5	13 7	11 7
1870	6 2	5 5	10 6	9 6
1871	5 7	5 3	10 1	9 1

"The highest published rate during June on wheat was 7½ cents, and the lowest 4½ cents. In May the highest quoted rate was 7½ cents, and the lowest 3½ cents. The average rate by canal last month was over 1 cent lower per bushel than the average for the preceding month."

CHICAGO RAILROAD NEWS.

Illinois Central Railroad.

The statement of the receipts of this company for the month of June, 1871, is as follows:

LAND DEPARTMENT.	
Acres construction lands sold	8,893.70 for \$51,392.60
Acres interest fund lands sold	80.00 " 886.00
Acres free lands sold	90.43 " 2,494.62
Total sales during month of June, 1871...	9,073.13 for \$54,659.22
To which add town lot sales	1,719.90
Total of all.....	9,073.13 for \$56,349.12
Cash collected in June, 1871.....	\$141,622.37

ESTIMATED EARNINGS—TRAFFIC DEPARTMENT.

	In Illinois, 707 miles.	In Iowa, 402 miles.	Total, 1109 miles.
Freight	\$418,346.00	\$72,699.00	\$491,045.00
Passengers	123,313.53	49,361.65	172,675.18
Mails	6,375.00	3,089.33	9,464.33
Other Sources	74,000.00	2,940.67	76,940.67
Total, June, 1871.....	\$621,034.53	\$118,054.65	\$739,089.18
Total actual earnings, June, 1870.....	578,379.63	134,266.98	712,646.63

This shows an increase of \$42,654.88, or 7½ per cent., on the Illinois lines; a decrease of \$15,312.33, or 16 per cent., on the Iowa lines; and on all the lines operated an increase of \$27,342.55, or about 3½ per cent.

Chicago & Michigan Lake Shore.

But one daily passenger train, each way, now runs over this road through from New Buffalo to Muskegon. Another daily train will be added on the 1st of September to connect with the Michigan Central's night express which leaves Chicago at 9 p. m.

Chicago & Northwestern.

The extension of the Fox River Branch of this road from Richmond northwest 11 miles to Geneva, Wis., on Lake Geneva, has been completed, and will probably be opened for business as soon as the 1st of August. The building of this short piece of road makes accessible one of the most attractive summer resorts within a modern Sabbath day's journey of Chicago. It is intended to run the trains from Geneva over the Fox River Branch only as far as Crystal Lake, and then to Chicago over the Wisconsin Division, thus materially shortening the ride.

Chicago & Alton.

The new transfer boat, "McMullin," which arrived at Louisiana, Mo., on the 11th of July, is said to be the largest transfer boat on the Mississippi, carrying 12 cars at a load.

The track is laid from Roodhouse as far west as the Illinois River and the bridge there is rapidly building. In Missouri the tracklayers were to reach Mexico, going west, to-day. It is expected to have the whole line, from Roodhouse to Mexico in operation by the 1st of September.

The earnings of the Chicago & Alton Company for the second week in July were \$131,823.68, showing an increase of \$25,770.04, or 24½ per cent., over the same week in last year.

OLD AND NEW ROADS.

Toledo, Wabash & Western.

This company offers to maintain its shops at Fort Wayne, provided the city will give it cash and real estate worth \$50,000. The company wishes to enlarge its shops so as to employ about 800 men instead of 400, as at present.

Indianapolis, Peru & Chicago.

This company has just issued mortgage bonds of \$1,000 each, to the amount of \$1,000,000, to defray the general expenses of the road. The trustee of this mortgage is Clifford H. Hand.

Lafayette, Bloomington & Mississippi.

This road, which is ready for the iron from Bloomington to the State line, has been leased to the Toledo, Wabash, & Western Company, who will iron it and complete it in Indiana to Attica, on their own line, in European & North American.

The Boston Advertiser says the track-laying is progressing rapidly both westward from Vanceborough and east from Mattawamkeag. Fully thirty miles of the fifty-eight between Winn and Vanceborough are already laid, and the chief engineer reports that all can be laid by August 20. The Governor of New Brunswick has been notified of the promised visit of President Grant on the occasion of the formal opening of the road, October 11.

stead of making the terminus at Lafayette, as originally intended.

Boston, Hartford & Erie.

The Supreme Court of the State of Rhode Island has granted an order to show cause why a final order for the foreclosure and sale of the division of the Boston, Hartford & Erie road in that State should not issue. It is expected that similar orders will issue in Massachusetts, Connecticut and New York.

Western Maryland.

This company is grading a line for an entrance into Baltimore from Owning's Mills, eight miles, for which distance it is now using the line of the Northern Central. It will shorten the distance about four miles.

Connecticut Valley.

It was expected that this road would be completed so that a train would run through from Hartford to the Sound at Saybrook to-day (July 22).

North Side of Staten Island.

The entire capital of this company, \$100,000, was subscribed on the 14th inst. It intends to construct a narrow-gauge railroad from Ward's Point, in the town of Westfield, on the southwesterly side of the island, terminating in the town of Middletown, or Castleton, at or near the northeast end of the island. The route will be through Richmond, Springfield, Port Richmond, West New Brighton, and will be about fifteen miles in length.

Among the subscribers to the capital stock are Mr. Samuel Barton, of the firm of Barton & Allen; B. Kreischer, of Kreischer & Co.; Thomas Sampson, William Mackellar, Theodore Wilkens, A. Winant, Albert Steinway, Geo. W. Ellis, John J. Crooke, D. B. Sickels, Owen H. Barnard, S. R. Brick, Jr., and other well-known gentlemen of influence and wealth. It is thought that the road can be thoroughly completed and put in running order before next spring.

Rockford, Rock Island & St. Louis.

The branch of this road from Rock River Junction (36 miles southwest of Sterling), southward across Rock River to Colona, which was originally intended as an outlet for productive coal mines said to exist in that vicinity, is to be abandoned, it is reported, and the iron and ties used on the main line.

Ohio & Mississippi.

The work of changing the gauge of the North Vernon & Jeffersonville Branch of this road was effected on the 16th inst., being finished at 3 o'clock in the afternoon. The change of gauge on the main line is to be made on Sunday the 23d inst.

Marshall & Coldwater.

At a stockholders' meeting, held on the 6th of July, amendments to the articles of association were agreed to extending the line to Walton, in Eaton County, Michigan, making the estimated length of the line 40 miles, and increasing the capital stock of the company to \$350,000, to bring the capital to the statute figure of \$8,000 per mile.

On the 10th the contract for grading from Girard to Marshall was let to F. W. Dickey & Co., of Marshall; and from Marshall to Walton, to John Kent, of Coldwater. The work is to be completed by the 1st of December next.

Cincinnati & New York.

A telegram from Cincinnati, dated the 30th, says: "About three months ago a railroad company was organized here, known as the Kentucky & Great Eastern, with Colonel S. W. Morton, of New York, as President, A. J. Hodder, Vice-President, and, besides these, as directors, General Fremont, General Banks, Judge Cutler, of Marietta; J. M. Dake, of Maysville, and James T. Brady, of Pittsburgh. This was ostensibly to construct a road from Cincinnati to Catlettsburg, Kentucky, under a charter granted by the Kentucky Legislature last year. This then did not attract much attention. It now appears that it was but a small part of the purchase, and that the real plan was to build another railroad from Cincinnati to New York City, through Kentucky, and across West Virginia to Point of Rocks, Va., thence by roads now constructing through York and Reading, Pa., to the eastern terminus. It is stated that the company has purchased the franchise and property of the Maysville & Big Sandy Railroad, which is to become part of the line. Those in the interest claim that this will be, by measurement, 120 miles shorter from Cincinnati to New York than the route by the Pennsylvania Central, the shortest existing line. It is announced that work will be commenced in Kentucky within three months, and that a line to New York will be finished in less than three years. It appears that the same parties are interested in the new movement to finish the old tunnel, partly constructed through the hills north of the city, the contract for which has doubtless been made, this part of the project being intended to furnish Northwestern connections."

"Those in the interest" are much mistaken when they assert that such a road would be 120 miles shorter than the Pennsylvania route to New York. It would be much longer, and quite as long as, and probably longer, than the present route to New York via the Baltimore & Ohio.

Burlington, Cedar Rapids & Minnesota.

Track-laying has been resumed, and is progressing at the rate of one mile per day. It is expected that the section between Cedar Falls and Mason City will be in running order by November 1. Most of the section is all ready for the iron.

Decatur & State Line.

About 100 miles of this road has been located, from Decatur northeast, through Farmer's City and Chatsworth, to the Kankakee River, about ten miles west of Kankakee. No work, other than engineering, has yet been done.

Baltimore, Pittsburgh & Chicago.

The Toledo Blade of the 15th says: "It is known that the engineers of the Baltimore & Ohio Railroad are now engaged in surveying a direct route for the extension of their road from Pittsburgh to Chicago, and that when the route is finally determined upon it will be built without delay. The survey is completed, we are informed, from Pittsburgh to Havana, a small station on the Lake Erie Division of the Baltimore & Ohio Railway, eight miles south of Monroeville, Ohio. From thence, it is expected, according to the programme now being pursued, the line will run to Defiance, on the Toledo, Wabash & Western Railway, crossing on its way the Dayton & Michigan Railway at a point now called Ellsworth. If we are rightly informed, the engineers are now at work on this part of the line. From Defiance it is expected that the engineers will work their way along to Bryan, and through Lagrange and Steuben counties to Laporte." The Blade recommends that the line be constructed from Havana to Toledo, and thence nearly due west about midway between the old road and the Air Line of the Michigan Southern, by which the distance would be increased 15 or 20 miles. This line, however, would not afford so good a local traffic as the southern line, from which Toledo can be reached by a branch not more than 40 miles long.

Kansas Pacific.

The General Ticket Agent, Mr. Beverley R. Keim, has issued the following circular:

"In order to show the general public, as well as intending emigrants, the vast resources of the country tributary to our line of road, I propose to establish, in connection with my department, a cabinet to display the agricultural and mineral products of Kansas and Colorado. I would therefore solicit the co-operation of all who are interested in the development of the resources of Kansas and Colorado; and to more successfully carry out these views, contributions of the various products of the country, such as samples of grain, vegetables, fruits, etc., specimens of the various ores, coal, minerals, fossils, etc., will be thankfully received and placed on file.

"Persons desiring to contribute any of the above articles, will please place them in the hands of any agent of this company, and they will be promptly forwarded to this office."

Plymouth, Kankakee & Pacific.

Such progress has been made that it is believed that the track will be laid from Plymouth Ind., to Kankakee before the end of the year.

Winona & St. Peter.

There are now one passenger, one accommodation and three freight trains daily each way over this road. The passenger train leaves Winona at 10:15 a. m. and arrives at St. Peter (189½ miles) at 6:25 p. m.; leaves St. Peter at 8:15 a. m. and arrives at Winona at 4:30 p. m. The accommodation leaves Winona at 8:45 p. m. and reaches Rochester at 8 p. m.; leaves Rochester at 6:15 a. m. and reaches Winona at 11 a. m.

This company operates also the La Crosse, Trempealeau & Prescott Railroad from Winona across and down the Mississippi to a junction with the Milwaukee & St. Paul Railway near La Crosse, and, in connection with the latter, the part of the St. Paul & Chicago Railway completed from Winona northward to Weaver, 20 miles. On this line, from Winona Junction (near La Crosse), to Weaver, 48 miles, a passenger train makes the trip up in four hours, leaving Winona Junction at 7:30 a. m., and the trip down in 6½ hours, leaving Weaver at 1 p. m.

Contracts have been let for grading the extension of this road from St. Peter to New Ulm, the work to be completed this season, and 500 men will be set to work at once. The bridges over the Mississippi River at Hastings and Winona are to be completed by the 25th of September, at which time the St. Paul & Chicago Railroad will be completed.

Colorado Central.

This railroad, now in operation from Denver westward 15 miles to Golden City, is controlled by persons interested in the Union Pacific, all or nearly all the railroads of Colorado being in the interest of the Kansas Pacific. To connect, it is proposed, eventually, to construct a line from Denver northward to the Union Pacific at Pine Bluffs, 43 miles east of Cheyenne; but it is to be extended westward from Golden City 12 miles into the mountains immediately, and probably to Central and Georgetown.

Canadian Railroads.

The *Monetary Times* recounts the following Canadian Railroads on which work is progressing this season: a branch of the Great Western from Harrisburg to Brantford, the two narrow-gauge lines from Toronto (the Toronto & Nipissing and the Toronto, Grey & Bruce), the Wellington, Grey & Bruce, the Canada Air Line and the parallel road, the Canada Southern. Among the most promising schemes not yet begun are a line from London northward into the counties of Grey and Bruce, the Credit Valley Railway, an extension of the Berlin & Doon Branch of the Grand Trunk to Galt, a branch line to connect Hamilton with the Buffalo Division of the Grand Trunk at Caledonia, or with the Canada Air Line or Canada Southern near that place. All of these are in the Province of Ontario.

The Winona Bridge.

The part of this bridge which broke down under a train lately is to be replaced by an iron structure, which is to be completed by the 1st of September. The American Bridge Company has the contract.

The Buffalo Bridge.

The work of this bridge has been somewhat delayed by a collision of a great raft with the fifth caisson shortly after it had been placed in position. The caisson was dragged down stream some distance until it grounded at the foot of an island.

Mississippi, Muscatine & Western.

Under this name a company of which Hon. J. B. Grinnell is President, proposes to construct a railroad from Wapello—miles north of Burlington, on the Burlington, Cedar Rapids & Minnesota road, up the Mississippi through Muscatine and Davenport to Clinton, connecting all these places with the Northwestern, and opening a new route to Chicago to them. An extension, a few miles further north, in connection with roads now under way, would complete a river line from Burlington to St. Paul and St. Cloud.

Kansas & Nebraska.

A company has been organized to construct a railroad on a north and south line across the State of Kansas, passing through Maryville on the St. Joseph & Denver road and Junction City on the Kansas Pacific. Davis County, in which Junction City is situated, is to vote on August 8 on the question of subscribing \$150,000 to the stock of the company.

Davenport & St. Paul.

The Davenport (Iowa) Gazette of the 17th says: "The work of building the Davenport & St. Paul Railroad, along the route of the main line, from Eldridge Junction northward, is to be pressed forward with increasing activity during the months intervening before the advent of winter. The completion of the Peoria & Rock Island road, now nearly reached, will enable the transfer to the Davenport & St. Paul of a large part of the forces employed in the construction of the former road; and as these men have had much experience in their work the accession will be an important one. The needed iron, or at least 5,000 tons thereof, is already in process of shipment, and nothing but delay in the work of grading and tying can now prevent the rapid extension of the road to the State line and beyond."

Louisiana & Missouri River.

This road was to be completed this week from Louisiana westward to Mexico, 51 miles, where it connects with the North Missouri Railroad.

California Pacific.

Two miles of the Sonoma extension of this road, between Adelante and Napa Rivers, has been completed. The middle pier of the draw-bridge over Napa River has been finished, and workmen are engaged driving piles for the other piers.

Utah Central.

The extension of this road from Salt Lake City southward is completed to Little Cottonwood, eight miles, and work is progressing steadily.

Atchison, Topeka & Santa Fe.

At a meeting of the stockholders of the St. Louis, Lawrence & Denver Railroad Company, the lease of that portion of the line from Lawrence westward to Carbondale, about 32 miles, lately made by the directors to the Atchison, Topeka & Santa Fe Railroad, was unanimously confirmed. Under this lease, the St. Louis, Lawrence & Denver Company are to construct the road, the latter company taking the road only when completed. This will give the Atchison Company an eastern outlet independent of the Kansas Pacific, as the Missouri Pacific's line from Pleasant Hill to Lawrence is soon to be completed.

Minneapolis & St. Louis.

The County Commissioners of Hennepin County, Minn., have obtained an injunction against the Minneapolis & St. Louis Railroad Company, to restrain the latter from running a railroad across the highway leading to Suspension Bridge, which is the property of the county. A construction train on this road reached Minneapolis, from White Bear, on Saturday evening, and on Sunday, for fear of civil process, the track was laid, of which the Commissioners complain.

Alabama & Chattanooga.

On Thursday night of last week a large body of disguised men went to the Alabama & Chattanooga Railroad yard at Chattanooga, Tenn., and captured and locked up the watchman in the round house, and then disabled all the engines in the house by removing parts of the machinery, which can only be replaced from shops in the East. No clue to the perpetrators could be obtained. No train left the city on that road on Friday. Superintendent Stanton was in New York at the time, endeavoring to make arrangements for funds to pay the employees.

A North and South Kansas Line.

It is proposed to construct a railroad from the Indian Territory, near the point where the Arkansas River enters it, a little west of north to Fort Kearney, on the Union Pacific, crossing the Kansas Pacific at Salina, 185 miles west of Kansas City and 47 miles west of Junction City.

Hoosac, Rome & Oswego.

This road has been organized in New York to complete a new and direct communication between Oswego and Boston. The proposed road is 125 miles long. It begins at Eagle Bridge, on the Troy & Boston Railroad, 23½ miles northeast of Troy, runs thence through Ballston Spa and Rome to North Bay; thence over the Midland to Oswego. From Eagle Bridge to the Tunnel, and thence to Boston, a road is already in operation. The projected road from Eagle Bridge to North Bay will, in connection with roads already built, form a nearly direct line from Ontario to Boston through the Hoosac Tunnel.

Jonesville & Lansing.

It is said that the Lake Shore & Michigan Southern Railway Company has offered to iron, equip and operate this road, provided the road-bed is completed by the country on the line. Work was done on it many years ago, when it was commonly known as the "Rams-horn Railroad." The route crosses the Air Line at Homer, and the Central at Albion.

Grand Rapids & Bay City.

A survey has been completed for a railroad between these two Michigan cities. The distance is about 100 miles from southwest to northeast, but by using the Grand Rapids & Indiana road to Rockford, nine miles above Grand Rapids, and the Flint & Pere Marquette for about 80 miles from Bay City, the road to be constructed will be considerably less.

Oregon & California.

J. L. Hallett, late Assistant Superintendent of this road, has taken the contract for its extension from the present terminus at Albany (80 miles south of Portland) southward to Eugene City, 20 miles.

Atlantic & Great Western.

On Wednesday next so much of this road as lies in Ohio will be sold at auction by the sheriff of Akron County. The sale will include all its tracks, real estate, depots, bridges and tenure of its leased lines, in Ohio, and two-thirds of all its engines, tools and machinery used in New York, Pennsylvania and Ohio. The suit upon which the order of sale is made is that of John E. Penn vs. The Atlantic & Great Western Railway Company. The Cleveland Herald says: "The sale will be made subject to mortgages and a deed of further assurance held by Azariah C. Flagg and Chas. J. Stedman, amounting to \$1,181,655.50, for over-due coupons on March 1, 1871, besides \$206,090.24 interest thereon to date, as well as for \$130,728.05 coupons due April 1, 1871; and also for \$3,740,000 in bonds of the company, secured by said mortgage, and due October 1, 1876, with 7 per cent. semi-annual interest.

"Besides these, the property is subject to other liens, prominent among which are certain debts growing out of contracts with the Cleveland & Mahoning Railroad Company. It is specified that the whole property shall be sold entire and at not less than two-thirds of \$6,653,233, its formally appraised value. The purchaser will be required to pay down at the time of sale not less than \$100,000 and give acceptable security for the remainder.

"Thus far we see indications of only two bidders who will compete for the purchase of the road. One party will be General McClellan, Senator Thurman and W. B. Duncan, Esq., who, as trustees, represent the English and German holders of a majority of the Atlantic & Great Western mortgage bonds, and are, therefore, the bona fide owners of the road. These parties have agreed upon a policy which, if carried out, will restore the declining broad-gauge route to its proper place among the great railways of this country.

"The other bidder will be the Erie managers, who at present hold possession of the Atlantic & Great Western by lease. Of the intention of these men to buy the road little is definitely known, but it is certain that they are preparing to attend the sale in strong force. In addition to this, the fact that the Erie men have been laying new iron on the Atlantic road for some weeks past at the rate of from one to two miles per day, is regarded very significant of their purpose to buy it."

St. Louis & Southeastern.

A time table for the Evansville Branch, taking effect July 5, gave the following stations and distances from Evansville westward:

	Miles.		Miles.
Evansville.....	0	Stockford.....	14
Coal Mines.....	1	Mount Vernon.....	19
Belknap.....	1	Upton.....	24
Caborn's Summit.....	13		

It was intended to open the line to the Wabash Bridge on the 20th inst. Track-laying was commenced last week at Enfield, on the Springfield & Illinois Southeastern road, about 20 miles west of the Wabash Bridge, and is progressing thence eastward. By the 1st of November the Wabash Bridge is to be completed and the line opened from Evansville to St. Louis, 160 miles. H. L. Morrill, Evansville, is Superintendent.

Illinois, Missouri & Texas.

This road is ready for the iron fifteen miles from Cape Girardeau, and the grading nearly done for twenty-five miles. It is reported that Ex-Governor Fletcher has purchased the iron and rolling stock, and that the road will be open to Lakesville, twenty-five miles, by the 1st of January next.

Chicago, Southwestern & Pacific.

The City Council of Lawrence, Kansas, has granted the right of way through the city to this road, provided machine shops be located within the corporation limits of the city.

Belleville & Southern Illinois.

A special train of an engine and three cars ran the distance between New Athens and Beaucamp, 9¼ miles, in nine minutes, on the 12th inst.

Cairo & St. Louis.

The St. Louis Republican of the 16th inst. says: "A meeting of the directors of this company was held at Jonesboro, Ill., on Thursday of last week, at which a contract was made for the construction of the road, to be completed within two years from the first day of September, next, the time when work is to commence. The road is to be built upon the new or narrow-gauge plan, and will be commenced as soon as the local subscriptions, which have been voted, are made."

Sioux City & St. Paul.

The Sioux City Journal is informed that the work on this road in Iowa is not yet let, except about ten miles in Osceola County, next to the Minnesota line; and that it is not yet determined whether the remaining 60 miles to Le Mars shall be done this year.

Chicago & Southwestern.

On the 17th inst. Atchison voted by a large majority in favor of a proposition to subscribe \$50,000 in order to secure a branch of this road. It is to be commenced immediately and completed within a year. This will give the Southwestern the best connection with the Atchison, Topeka & Santa Fe road.

Toledo & St. Louis.

A new railroad from Toledo to St. Louis is proposed, to be constructed on a very direct line, passing through or near Decatur, Bluffton and Marion, Ind., and Mattoon, Ill. Considerable interest in the scheme is manifested along the line.

Leavenworth Railroads.

On the 10th of August the citizens of Leavenworth are to vote on the propositions to give \$250,000 of the stock held by the county in the Kansas Pacific Railway to the Kansas Central Railroad, narrow gauge, from Leavenworth to Denver, with branches to the northwest and southwest; \$150,000 in thirty-year county bonds, and \$300,000 of the stock held by the county in the Chicago & Southwestern Railway to the Chicago, Southwestern & Pacific Railroad, for the building of machine shops in that city, and the building of the Leavenworth & Topeka Railroad; \$150,000 of county bonds to the Leavenworth & Southern Kansas Railroad to connect with the railroads at Olathe and Ottawa. It is believed all the propositions will carry by a large majority.

Chesapeake & Ohio.

Track-laying is going on in both directions from Coalsmouth, on the Western Division, which it is expected to complete by October.

Great Western of Canada.

This company has proposed to the Hamilton & Lake Erie Company to construct, equip and operate the latter company's road from Hamilton southeastward to a junction with the Air Line near Caledonia if it will obtain and transfer \$82,500 in municipal aid. It also proposes to give the Grand Trunk Company running powers over the proposed line forever for all the business between Hamilton and that part of the Buffalo & Lake Erie Division of the Grand Trunk west of Paris, its junction with the Great Western.

Owasso & Big Rapids.

This is a line from Owasso, Michigan, on the Detroit & Milwaukee Railroad, northwest 80 miles to Big Rapids, on the Grand Rapids & Indiana road, 55 miles above Grand Rapids. Grading on the first division, from Owasso to Alma, is commenced.

Arkansas Central.

This railroad is to cross White River at Aberdeen, eleven miles south of De Vall's Bluff (where the Memphis & Little Rock crosses) and 45 miles a little north of west from Helena. It is expected that cars will be running between Helena and Aberdeen by the middle of September.

Toledo & Mansfield.

The *Mansfield Herald* says: "Work is now progressing at Toledo and Woodville, and will soon be under way throughout the line. A goodly start in the shape of finished road-bed has already been made near the Dayton & Michigan track, South Toledo, and the entire line to Woodville is to be ready for iron by the 1st of September, and completed ready for cars to Mansfield by January 1st, 1872."

Cincinnati & Terre Haute.

A preliminary survey for this proposed narrow-gauge railway was commenced at Terre Haute this week.

Lafayette, Muncie & Bloomington.

The entire amount of work done east and west of Lafayette amounts to \$2,780.34, upon which there has been paid \$167,726.78. The road-bed is ready for the iron from Lafayette to Illinois State line. Contractors are at work in every county from Lafayette to Muncie, and it is believed the entire road-bed will be ready for the iron by December 1.

Blue Ridge Railroad.

In a letter to the *Cincinnati Railroad Record* Mr. J. W. Harrison, the President of this company, says:

"After many vexatious delays, occasioned mainly by the peculiar condition of the finances of this State, and the distrust of capitalists to invest in Southern securities, the Blue Ridge Railroad Company in South Carolina is again in a condition, I hope, to press the construction along the line more vigorously. A new company, composed of capitalists in South Carolina and New York, is now forming, who propose to complete the road in a short time on certain conditions. This proposition includes the issue of a preferred stock for \$2,000,000, bearing 7, 8 or 10 per cent. until the road is completed; after completion to have the same preference over stock now issued. The new company to hold or retire old stock. The company in this State and in New York propose to subscribe at once for one half of this preferred stock. With the \$2,000,000 of preferred stock, and the \$4,000,000 mortgage bonds endorsed by the State of South Carolina, this road can be completed in two years from this date."

Mr. Harrison proposes that Cincinnati should aid in the construction of his road, and connect with it by building a line about 150 miles long from Paris, on the Kentucky Central, via London, to a connection with the Knoxville & Kentucky road near the Tennessee line. He asks Cincinnati to subscribe for one million of preferred stock, concerning which the *Railroad Record* says:

"If there was any railroad sense in Cincinnati, it would not be necessary to make such an appeal to our citizens a second time. But there is not; and that is the reason why even the railroads that we have got and partly paid for, have slipped through our fingers, and are now being used to force trade to fill the coffers of other communities more energetic and far-seeing than ourselves."

"It is useless, we think, for Gen. Harrison to come here, with the expectation of getting any assistance—material—for the construction of the Blue Ridge Railroad. 'Silver and gold, have we none'—(that he can get at)—but if he comes and wants any resolute ones, we will pledge him the 'Chamber of Commerce' and the 'Board of Trade,' and if he deems it necessary, a

series framed by the combined wisdom of both boards of our City Council."

North Carolina Railroad.

A telegram from New York dated the 10th says:

"The Western Division of the Western North Carolina Railroad Company brings suit in the Supreme Court against Sidney W. Hopkins & Co., to recover \$800,000 on an accepted order. The suit grew out of the issuing of \$4,000,000 of bonds of the State of North Carolina to plaintiffs. George W. Swepson, who was President of the company at the time, and Milton S. Littlefield, it is alleged, sold the bonds in this city, and with somewhat over \$1,000,000 of the proceeds, bought bonds of some Florida railroad companies, which were afterward consolidated, and to which the Florida Legislature offered State bonds in exchange for the first mortgage bonds of the consolidated company. These Florida bonds were sent to this city, to Hopkins & Co., for sale. The State of North Carolina, however, appointed commissioners to examine into what had been done with the bonds of the North Carolina Railroad Company, and it is alleged that, under a threat of criminal prosecution, Swepson and Littlefield gave an order for \$8,000 in favor of the North Carolina road, and offered to furnish the iron for fifty-three miles of that road. This order Hopkins & Co. accepted, but afterward declined to pay, on the ground that they had not received the money for all the bonds, whereupon Sidney W. Hopkins was arrested and placed under \$300,000 bail. To-day a motion was made to vacate the order of arrest. It was argued by the defense that Swepson and Littlefield had no right to pay their own private debts to the North Carolina road with the proceeds of the sales of bonds issued to the Florida Railroad Company for a special purpose. The plaintiffs argue that by accepting the order defendants were not in position to question the plaintiffs' right to the road. Decision was reserved on the motion."

Walton Valley.

The New York *Tribune* says that this road "is advancing rapidly, and it is expected that it will be open this month as far as Rosendale, in Ulster County. The road will connect at Kingston with the Rondout & Oswego Railroad, now building to Oneonta. At Saugerties it will meet the Middleburgh & Susquehanna road, now running through the rich counties of Greene and Schoharie. At Athens it will connect with the Saratoga road, 46 miles in length, and completed to that place. Albany and Catskill are also striving to effect connections with it, which will greatly facilitate travel between the Northern, Eastern and Southern States."

North Side, of Long Island.

A company has recently been formed, with Thomas Wellwood, of Brooklyn, as President, and Daniel Remsen, of Flushing, Vice-President, for the building of a new railroad, to be known as the North Side Railroad of Long Island. The road will run from Williamsburgh to Orient Point, with a view of connecting with Boston. From Williamsburgh to Richmond Hill, Jamaica, the company will temporarily use the track of the South Side Railroad Company. From the latter point the road will branch east, running to the north side, at the base of the ridge of hills known as the Hog's Back, and will pass through the principal villages on the north side of the island. At Orient Point a ferry will be established to New London, the distance at this point being 20 miles. From New London passengers will take express trains for Boston. By this route the distance from New York to Orient Point will be 119 miles, and to Boston, 230 miles.—*New York Tribune*.

Cairo & St. Louis.

The last statement of the route of this road we have seen is as follows: "From East St. Louis almost south to Waterloo, thence to Red Bud, crossing the Okaw River at a point known as Fish Trap, where smelting furnaces and a rolling mill are in prospect; thence through Lively's prairie, Pope's coal bank, Sparrow and Georgetown; thence down the valley of the Ste. Mary's River via the city of Chester; thence via Rockwood and the Grand Tower to the Big Muddy. The advantages to be gained by the selection of this route are, cheapness of construction, shortness of distance, and the husbanding of the general business on either side of the road. From Sparta to the Big Muddy, on this route, the road will be along the valley of the Ste. Mary's, on a down grade of less than five feet to the mile; thence to the Big Muddy and Cairo on the same level with the Mississippi River, with not a cut or fill of any magnitude in the whole distance."

Peoria & Springfield.

Under this name a company was organized in Springfield on the 10th inst., to construct a railroad from Peoria south through Pekin to Springfield, about 60 miles. The following are the officers of the company: James Haines, of Pekin, President; John T. Stuart, of Springfield, Vice-President; Sidney Pulsifer, of Peoria, Treasurer; George N. Black, of Springfield, Secretary, and A. J. Ware, of Pekin, Attorney. An Executive Committee was chosen, consisting of James C. Conkling, A. J. Hodges, Jas. T. Stuart and Milan Alkire. The parties interested in this enterprise also control the organization for a railroad from Springfield due south to Litchfield, 42 miles, and have secured liberal subscriptions to the same at Litchfield. The road would intersect the Decatur & East St. Louis, running direct to St. Louis, making a line from Springfield to St. Louis 91 miles in length. It is said to be the intention of the company to advertise at once for proposals for building the road.

Wilmington & Western Railroad.

At a meeting of the board of directors, at Wilmington, Del., recently, the balance of bona fide subscriptions to bring the capital stock up to the required amount of \$250,000 was obtained. The road is to be built from a point on the south side of Christiana River to Loudensburg, Pa., eighteen miles, connecting with the Pennsylv-

ania & Delaware Railroad, now under construction. The main purpose of the road, however, is to connect through roads now built, and others in progress or projected, with Connellsville, via Peach Bottom and Gettysburg, and so with Pittsburgh, thus giving the latter another outlet to the sea.

New Routes to Washington.

The Washington correspondent of the *Cincinnati Gazette* gives the following account of the railroad improvements around Washington:

"The Pennsylvania Central, with the Northern Central, will, during the next session of Congress, have their new line, the Baltimore & Potomac, open to this point, and cars will then run directly through Baltimore, by way of Harrisburg, to Pittsburgh and points beyond, avoiding the present most vexatious delay at Baltimore. The tunnel under the latter city is rapidly constructing, work going on simultaneously at ten points. The through line from New York has lately entered into an arrangement with the Baltimore & Potomac Company for the use of the tunnel, so that when it is completed the present delay of dragging eastern trains across Baltimore by horses will be avoided. The opening of this new line to the city will bring welcome relief to all classes of citizens from the countless annoyances arising from a single company having the control of all transportation both of passengers and railroad freight. It will also compel the employment of first-class cars on both lines."

"While the corporations mentioned are pushing on their enterprises, the Baltimore & Ohio Company is as active as ever. The branch to the Point of Rocks will probably be open as soon as the new line to Baltimore, and then a saving of two hours over the present rapid time—22½ hours—to Cincinnati and points beyond will be effected. The opening of the Pittsburgh & Connellsville road to Cumberland, on the main stem of the Baltimore & Ohio, will then shorten the distance to Pittsburgh, and consequently to the Northwest, fully 70 miles more. This new branch and the bridges over the Ohio at Parkersburg and Bellaire will still make the Baltimore & Ohio line a very formidable rival to the Pennsylvania routes for the trade of the West. Both corporations are also pushing southward from this point. The Pennsylvania companies will soon have their direct road to Fredericksburg open, which will give them the control of the southern seaboard connections. Congress virtually gave them the well-known Long Bridge, and in place of that structure, which for years has been an annoying wreck, a substantial one is rapidly building, over which through cars from all principal southern cities of the Atlantic and Gulf coasts will reach Washington and pass north."

"The Baltimore & Ohio road will soon have connection across the Potomac by the aqueduct bridge at Georgetown, and thence south and southwest by the Orange & Alexandria line. From the Baltimore depot on the east to the bridge at Georgetown there will soon be a road in operation, called after that around Philadelphia, the Junction road, and operated on the same plan. These struggles between two such gigantic corporations as the Pennsylvania Central and the Baltimore & Ohio will soon extend to the shorter southern lines by which the Ohio River can be reached. The construction of the Chesapeake & Ohio road bids fair to go on rapidly, and it cannot be long before the Washington & Ohio road, now running to Leesburg, will be brought to the contest. These outlines of substantial gains in traveling communication with the capital, and all except the last assured, will sufficiently indicate the improvements in progress."

Cairo & Fulton.

The *St. Louis Times* says a contract for furnishing sixty miles of ties for the Cairo & Fulton road, thirty miles in Missouri and thirty miles in Arkansas, has just been let to Colonel White, of Missouri.

MECHANICS AND ENGINEERING.

Mont Cenis Tunnel.

According to the latest arrangements the opening of the Mont Cenis Tunnel which was to take place in the course of the month of August, is obliged to be postponed in order to devise some effective means of giving it a better ventilation. It was hitherto generally taken for granted that when the piercing of the tunnel was completed sufficient ventilation would be afforded by the rush of cold air from the northern slope of the mountain to the southern, but this theory is now found by experience to be a fallacy. When the first locomotive steamed through the tunnel it emitted such a prodigious volume of dense smoke that two of the engineers were suffocated, and the third came out into the open air in a state of almost insensibility. At the same time, in passing through the tunnel the heat is found to increase in a most unpleasant manner, as the natural temperature of the rock marks 30° Celsius, or 90½° Fahrenheit. Smoke-consuming engines have been ordered, and other means are being devised to create an artificial current of air, so as to improve the ventilation; but till this has been accomplished it is deemed expedient to postpone the opening of the mighty tunnel for public traffic *sine die*.—*Exchange*.

The English Block System.

The principle of the block system of signalling consists in dividing the line into sections by signal boxes at every station, or where they are too far apart, by a signal box between two stations, and never allowing more than one train at a time to be upon a section. When a train arrives at a station the signalman is not to give a signal for it to start until he receives an intimation from the signalman at the next box that the section between them is clear; as soon as the train starts from the station the section is considered "blocked" until it is telegraphed that the train has passed off it, that is, beyond the next box. The means of communication between the signalmen is generally that of the bell telegraph. I do not think that the code

of bell-signals makes any distinction as to goods trains unless they are controlled by separate signals. On some lines the signal-man receives a distinct bell-signal to announce the approach of an express train, as it is generally required that, for a train which does not stop, the line should be clear for at least two sections before the "all clear" signal is given.—*Correspondent English Mechanic.*

Michigan Bridge and Construction Company.

In noticing the organization of this company in a previous issue, it was stated that it was the successor of the Michigan Bolt and Nut Company. This is incorrect. The Michigan Bolt and Nut Company still preserves its identity, but being largely interested in the Michigan Bridge and Construction Company, the office of the latter is located, for the present, at their works, upon the suburbs of the city. It is intended, at an early day, to open the Bridge and Construction office in the heart of the city.

The new company has contracted for all the trestling on the Detroit, Hillsdale & Indiana Railroad.

Changeable Gauges.

The Erie Railway Company, it is reported, consider the "telescopic axles" by which narrow-gauge cars may be converted to broad gauge, too dangerous, and are about to adopt a new patent apparatus by which the entire truck of a car may be removed and replaced by another in three minutes.

The New York Viaduct Railroad and the Narrow Gauge.

A recent number of the *New York Sun* says: "Have the directors of the Viaduct Railway considered the propriety of building it on a three-foot gauge, or one still narrower, say two feet eight inches?"

"The passenger cars of this railway will, of course, be constructed like those now in use on the Harlem and Hudson River lines for short distances in and out of the city. The seats for passengers will be longitudinal benches placed against the sides of the cars just like the seats in our present horse cars. All the space required will be enough for the conductor to pass between the two rows of passengers. This can be afforded by a three-foot gauge, or even by one of two feet eight inches.

"The advantage of constructing the Viaduct Railway in this manner will not only be that the cost of building the road will be less, but that more tracks can be placed upon the same breadth of surface. Six tracks of two feet eight inches gauge would occupy less room than four tracks of the ordinary gauge of four feet eight inches and a half. If the Viaduct were to have many short curves, it might be necessary to use the broad gauge in order to allow a sufficient rate of speed; but as the curves will be few and large, this objection has no force."

It does not seem to have occurred to the editor in charge of the engineering department of the *Sun* that the tracks for the Viaduct road could not be placed nearer together by simply narrowing the gauge, unless the cars were also made narrow and that the latter can be done just as easily in a 4 feet 8½ inch gauge road as in one of 3 feet.

Dead Weight of Cars.

Commenting on the discussion of this subject at the Richmond convention, the *American Railway Times* says:

"It must not be forgotten that, as a matter of safety, and therefore of eventual economy, the strength of rolling stock must be great enough to meet the unexpected emergencies arising from a variable traffic; and perhaps we may include the emergencies arising from disturbances in the trains, such as slight collisions, slight obstructions on the rails, a careless handling of the throttle in starting trains, and other strains incident to the railway service. A ten-ton freight car built just strong enough to carry that amount of weight on a smooth road would not, we think, be a safe or profitable investment to the company. It is with rolling stock as with steam power, there must always be an overplus of it to meet emergencies; and that is what we suppose the committee mean by their report. The freight equipments of our railways have to be strong enough to meet these emergencies of variations in traffic and track disturbance; and it is equally the case in passenger equipment. Now this safe medium of strength cannot be secured without adding weight to the cars; and it is the opinion of many master mechanics that a few extra hundreds or tons of weight on a large-size passenger car is of very little consequence, if the additional strength is secured, because the car will run with greater steadiness and with less disturbance to the superstructure, while the life of the car will be much prolonged. Every observant passenger knows that a long heavy passenger car runs with much greater ease of movement than does a short car; its weight gives it its steadiness of movement, and as long as the weight on each wheel does not exceed the maximum limit which experience has shown can safely be carried by the rail, we are inclined to think the extra amount of gross weight in the car itself is not of so much disadvantage in the economy of operation as has been commonly supposed."

Dimensions of English Locomotives.

Correspondents of the *English Mechanic* give the following dimensions of locomotives in use on their lines:

A tank goods engine, running on the Vale of Neath Railway—which is broad gauge—has inside cylinders, and runs on six wheels, all coupled. Diameter of wheels, 4 feet 9 inches; diameter of cylinders, 18 inches; stroke, 24 inches. Width of steam ports, 1 foot 3 inches; length, 1½ inches. Length of exhaust port, 3½ inches; travel of valves, 5 inches; lap, 1½ inches; lead, 3-16 of an inch; clearance (inside), ½ inch. Length of barrel of boiler, 10 feet 6½ inches; smallest diameter of boiler, 5 feet 1 inch; thickness of boiler plates, ½ inch; number of tubes, 2.6; diameter of tubes (outside), 2 inches. Length of fire-box, 4 feet

10½ inches; width, 5 feet 8 inches; depth, 4 feet 9 inches (inside). The driving axle is 8½ inches square; diameter of other axles, 7 inches; diameter of crank journals, 9 inches; diameter of bearings for all the axles, 7½ inches; length, 10 inches. The heating surface of the fire-box is 112 square feet; of the tubes 1,305½ square feet; total 1,417½ square feet. Diameter of blast pipe, 6 inches. Total weight of engine, 40 tons; and it can take up an incline of 1 in 90 a train of 395 tons, or with engine 435, equal to taking 1,245 tons on the level. The water is carried in a saddle tank on the boiler, which holds 1,800 gallons. This engine is fitted with "Dub's wedge motion," which has only one eccentric for each valve. Height from rails to top of chimney, 14 feet 10 inches; area of fire-grate, 27½ square feet; the inside fire-box is made of ½ inch copper plates, except tube-plate, which is ⅞ inch.

The standard class of express engines on the Caledonian Railway, made by Messrs. Nelson, of Glasgow, have a total wheel-base of 15 feet 8 inches; driving wheels, 8 feet 2 inches diameter; leading and trailing wheels, 3 feet 8 inches; outside horizontal cylinders, 17½ inches diameter, 2 feet stroke; steam ports 1 foot 1 inch × 1½ inches; exhaust, 1 foot 1 inch × 3 inches; lap of valves, 1½ inches; blast orifice, 5½ inches diameter; length of barrel of boiler, 11 feet 7½ inches; diameter, 3 feet 10½ inches; length of external fire-box, 4 feet 8 inches; width 4 feet; area of fire-grate, 13.9 square feet; 192 tubes in boiler, 1½ inches in diameter; total heating surface, 1,172 square feet; total weight of engine in working order, 30 tons 13 cwt.; weight on leading wheels, 9 tons 5 cwt.; weight on driving wheels, 14 tons 11 cwt.; weight on trailing wheels, 6 tons 15 cwt. The valves are worked by what is known as the fixed box-link motion. The engines have inside and outside frames, the driving wheels having bearings on the inside, and the small wheels having bearings on the outside frames. The steam is taken from a small dome over the fire-box, and the boiler is fed by one pump and one injector. An engine of this class was exhibited at the International Exhibition of 1862, and bought by the Viceroy of Egypt, who now uses it for the Royal special trains on the Alexandria, Cairo & Suez Railway. The others, which are working on the Caledonian Railway, give great satisfaction.

Dimensions of goods engines: Engines by Sharp, Stewart & Co., London, Chatham & Dover Railway: Six wheels, coupled, 5 feet diameter; total wheel-base, 15 feet 6 inches; barrel of boiler, 10 feet 6 inches long, 4 feet 2 inches diameter. Double fire-box, 8 feet long, 4 feet wide (Cudworth's patent); cylinders, 17 inches diameter, 24 inches stroke; orifice of blast pipe, 5 inches. Engine by Beyer, Peacock & Co. Leading and driving wheels coupled, 5 feet diameter; trailing wheels, 3 feet 6 inches diameter. Total wheel-base, 15 feet; barrel of boiler, 10 feet long, 4 feet diameter; external firebox, 4 feet 10 inches long, 4 feet 1 inch wide; cylinders, 16 inches diameter; 22 inches stroke; orifice of blast pipe, 4 inches. Engine of London & Northwestern Railway, Crewe Works: Six wheels, coupled, 5 feet 2 inches in diameter. Total wheel-base, 15 feet 6 inches; barrel of boiler, 10 feet 9 inches long, 3 feet 10½ inches diameter; external fire-box 4 feet 9 inches long, 4 feet wide; cylinders, 17 inches diameter, 24 inches stroke; orifice of blast-pipe, 4½ inches.

Narrow Gauge.

In a statement attributed to General Rosecranz he is made to ask if any road of standard gauge has ever had more work than it could do. Whereupon the *American Railway Times* says that this "shows that he 'has had but little experience with most of the trunk' roads running to the Atlantic coast at certain seasons 'of the year. What road is that which carries five 'times as much freight per mile as the heaviest-worked 'road in the United States, and yet has not enough to 'do? We are afraid the narrow-gauge promoters are 'getting a little too enthusiastic to care much for 'facts.'"

RAILROAD LAW.

The Legality of the Acts of a Corporation out of the State.

In the Supreme Court of the United States, in the case of the *Galveston, Houston & Henderson Railroad Company et al. vs. N. A. Cordrey et al.*, it has been decided that a railroad corporation cannot repudiate a mortgage given to secure its bonds held by holders in good faith, on the ground that its directors authorized its execution, by a resolution passed at a meeting held without the limits of the State, the mortgage being, in other respects, executed and recorded in due form of law.

Concerning the Power of Counties to Grant Aid to Railroad Companies.

The Supreme Court of Kansas, in an opinion of forty closely printed pages, more extensive and elaborate than any we have elsewhere seen upon the subject, has thoroughly reviewed the entire law as to the right of municipal corporations to subscribe for stock in railroad companies, and has decided the law to be constitutional. The opinion cites, probably, every important case in this country upon the subject.

The analysis of the decision may be found in the following head notes:

The Board of County Commissioners of the County of Leavenworth vs. Edward Miller.—Error from Leavenworth County—Affirmed—Syllabus by the Court: Valentine, J.

1. The question whether the Legislature possess the power to authorize counties to grant aid to railroad companies by subscribing for stock therein, and issuing bonds in payment therefor, when it comes to the courts is purely a legal question, and the courts have nothing to do with the wisdom or policy of such legislation.

2. The Legislature have no inherent power, but all their power is derived from the people through the constitution of the State.

3. The people, in their primary capacity, possess all the political power of the State, and may themselves

authorize counties to grant aid to railroad companies; or they may, if they choose, delegate this power to the Legislature, and allow the Legislature to grant such authority to counties.

4. The Legislature cannot exercise any power retained by the people, or not delegated by the people to the Legislature.

5. Where the provisions of an act are designed for the whole State, and every part thereof, such act has, in contemplation of section 17, article 2, of the constitution, a uniform operation throughout the State, notwithstanding the condition or circumstances of the State may be such as not to give the act any actual or practical operation in every part thereof.

6. Section 8, article 11, of the constitution, which prohibits the State from ever being a party in carrying on any works of internal improvement, applies to the State in its sovereign corporate capacity, and to the subordinate political subdivisions thereof. It prohibits the State as a State, and not counties, from being parties in carrying on any works of internal improvement.

7. There is no express provision of the constitution which prohibits the Legislature from authorizing counties to become stockholders in railroad companies, and issuing their bonds in payment for such stock.

8. All presumptions are in favor of the constitutional validity of a statute, and before the courts can declare it invalid it must clearly appear to be unconstitutional.

9. The power of the Legislature to pass an act granting municipal aid to railroad companies must be found in the general grant of legislative power of section 1, article 2, of the constitution, which provides that the legislative power of the State shall be vested in the Legislature, or not at all.

10. At the time the constitution was framed, the term "legislative power," had a definite and precise signification with reference to this question, established by legislative, executive and judicial construction, practice and usage, and the general understanding of the people throughout the United States; which general understanding and signification was that the term "legislative power," included the power to grant municipal aid to railroad companies, and therefore, in the absence of anything to the contrary, it must be presumed that the people of this State, when they framed their constitution, used said terms with the signification generally given to it, and, therefore, that they intended to give to the Legislature the power to pass acts granting municipal aid to railroad companies.

11. If such was the intention of the people, the constitution must be construed by the courts, and the courts have no power to amend it, or change any of its provisions, or insert any new provisions in it, through the means of judicial construction or interpretation.

12. The aid given to a railroad company is not strictly for a private purpose, nor wholly for a public purpose, though the object intended by the Legislature is a public purpose.

13. The government may accomplish a public purpose through the means of a private agency, a private individual or individuals, or a private corporation.

14. It is the ultimate object to be obtained which must determine whether a thing is a public or a private purpose.

15. The ultimate object of the government in granting municipal aid to railroads, is to increase the facilities for travel and transportation from one part of the country to the other, which object is in its nature a public purpose.

16. And if a railroad is made absolutely free for every one who chooses to ride and transport goods upon it, it is still a public purpose, notwithstanding the government may allow a (in other respects) private corporation to own and operate it, and to receive a compensation therefor, provided it is a road for which the government exercises the right of eminent domain and retains the right to fix the compensation.

17. Taxation is the most universal power possessed by governments, being an incident and auxiliary of every other power, and may be resorted to whenever it is necessary to accomplish a public purpose, or to carry out any other power granted to the Legislature.

18. The localities along the line of a railroad may be taxed to aid its construction and operation, if they choose to take stock therein and issue bonds thereto, and a fair rule of apportionment of which the taxpayers cannot complain, is to allow the localities to be taxed, the privilege of saying how much the benefit of the improvements is worth to them, and for what amount they are willing to be taxed.

Suez Canal.

In a recent letter to the city editor of the *London Times*, Mr. D. A. Lange states the following to have been the receipts of the canal for the month of April last:

	Francs. c.
Passage dues on 55 ships.....	637,406 9
" " " small craft.....	12,340 26
Transit of merchandise.....	3,102 06
" " passengers.....	7,836 19

Total..... 649,594 49

At 25f. to the pound..... £25,983 15s. 7d.

The amounts received from rents on property and other sources in April have not been forwarded by the last mail from Egypt, and are, therefore, not included. These items in the preceding month (March) amounted to £,004 17s. 4d.

Mr. Lange proceeds to observe:

It is somewhat curious, and has been a subject of remark in France, that since the opening of the canal the French should have made no effort to construct ships adapted to its use, whereas England's example in this respect has been actively followed by Holland, Russia, and other countries, where powerful shipping companies have been formed for that purpose. It may not be superfluous to add that the canal has now a depth of water throughout of 26 English feet.